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Thoroughfare Plan
Study Report
for the
City of Laurinburg
and
Town of East Laurinburg

Prepared by the:

Statewide Planning Branch
Division of Highways
N. C. Department of Transportation

In Cooperation with:

The City of Laurinburg
The Federal Highway Administration
U. S. Department of Transportation

Terry Carmack
12.3.99

September, 1999

Acknowledgments

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Executive Summary

In August of 1994, the Statewide Planning Branch of the North Carolina Department of Transportation and the City of Laurinburg made a formal agreement to begin an update of the 1979 Laurinburg/East Laurinburg Thoroughfare Plan. The resulting Laurinburg/East Laurinburg Thoroughfare Plan, as shown in **Figure 3**, resulted from the implementation of the thoroughfare planning principles described in Chapter IV of this report.

The Thoroughfare Plan study is based upon the traditional four-step planning process: trip generation, trip distribution, mode choice, and trip assignment. This study involved two repetitions of this process. The first application required the collection of socio-economic data (employment and housing information), traffic count data, and geometric street data in the 1996 base year. Use of this data resulted in the simulation of a computer model representation of the Laurinburg/East Laurinburg existing traffic patterns. The second application involved the projection of the socio-economic data and external station traffic volumes to the 2025 design year. The four-step process was applied to these projected data, thereby forecasting future traffic patterns for the planning area. A comparison of these traffic patterns to the existing roadway capacities identified anticipated roadway deficiencies for which various solutions were tested.

This report documents the findings of this study, along with the resulting recommendations for improvements. In addition, this report presents thoroughfare cross-section recommendations, cost estimates and benefit evaluations for the recommended improvements, and plan implementation recommendations.

After several informational meetings with the Planning Department, City Council, and citizens of the planning area, the Laurinburg/East Laurinburg Thoroughfare Plan was unanimously adopted by the Laurinburg City Council at a public hearing held on January 19, 1999, and was adopted by the Town of East Laurinburg on April 6,1999.

Initiative for plan implementation rests largely with the policy boards and citizens of the planning area. Highway needs throughout the State exceed the available funding; therefore, local areas should aggressively pursue funding for the projects they desire.

It is important to realize that the recommended thoroughfare plan is based upon anticipated growth and development of the planning area reflecting current zonal trends as provided by the City of Laurinburg. Prior to the construction of specific projects, a more detailed study will be required to reconsider development trends and determine specific design requirements.

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I. Introduction

A well planned transportation system plays an imperative role in our economy and our way of life. This system will provide a means of transporting people and goods from one place to another quickly, conveniently, and safely. A well planned system will meet the existing travel demands, as well as keep pace with the growth of the region. The City of Laurinburg recognized the importance of this process of planning for future transportation needs, and requested thoroughfare planning assistance from the Statewide Planning Branch of the North Carolina Department of Transportation (NCDOT) in June, 1994. A formal agreement between the Statewide Planning Branch and the City of Laurinburg was made in August, 1994 to update the existing Laurinburg/East Laurinburg Thoroughfare Plan.

The City of Laurinburg is located in the southern portion of Scotland County, bordering South Carolina. The City of East Laurinburg is located immediately east of the Laurinburg City Limits. The geographical location of Laurinburg and East Laurinburg are shown in **Figure 1**.

This report documents the development of the 1999 Laurinburg/East Laurinburg Thoroughfare Plan shown in **Figure 2**, which replaces the 1979 plan presented in **Figure 3**. In addition, this report presents thoroughfare cross-section recommendations, cost estimates and benefit evaluations for the recommended improvements, and plan implementation recommendations. A thoroughfare plan is developed to ensure that the transportation system will be progressively developed, meeting the needs of the Laurinburg Planning Area. The thoroughfare plan will serve as an official guide to providing a well coordinated, efficient, and economical major street system. It will be utilized by local officials to ensure that planned transportation facilities will reflect the needs of the public, while minimizing disruption to local residents, businesses, and the environment.

The purpose of this study was to examine present and future transportation needs of the Laurinburg area and develop an updated thoroughfare plan. The proposed system of thoroughfares was developed following the basic principles of thoroughfare planning as described in Chapter VIII of this report. The plan recommends those improvements which are necessary to provide an efficient transportation system within the 1996-2025 planning period. The recommended cross-sections for these improvements are based on existing conditions and projected traffic volumes, and are outlined in **Appendix F**.

Initiative for the implementation of the Thoroughfare Plan rests predominately with the policy boards and citizens of the Laurinburg area. The responsibility for proposed construction is shared by the City of Laurinburg and the North Carolina Division of Highways, however, highway needs throughout the state exceed available funding. Therefore, it is imperative that the local area aggressively pursue funding for desired projects.

The proposed thoroughfare plan is based on the anticipated growth of Laurinburg and the surrounding area. It is possible that actual growth patterns will differ from those logically anticipated. As a result, it may be necessary to accelerate or retard the development of some thoroughfares found on the plan. Likewise, some portions of the thoroughfare plan may require revisions in order to accommodate unexpected changes in urban development.

GEOGRAPHIC LOCATION MAP

FOR

LAURINBURG/ EAST LAURINBURG

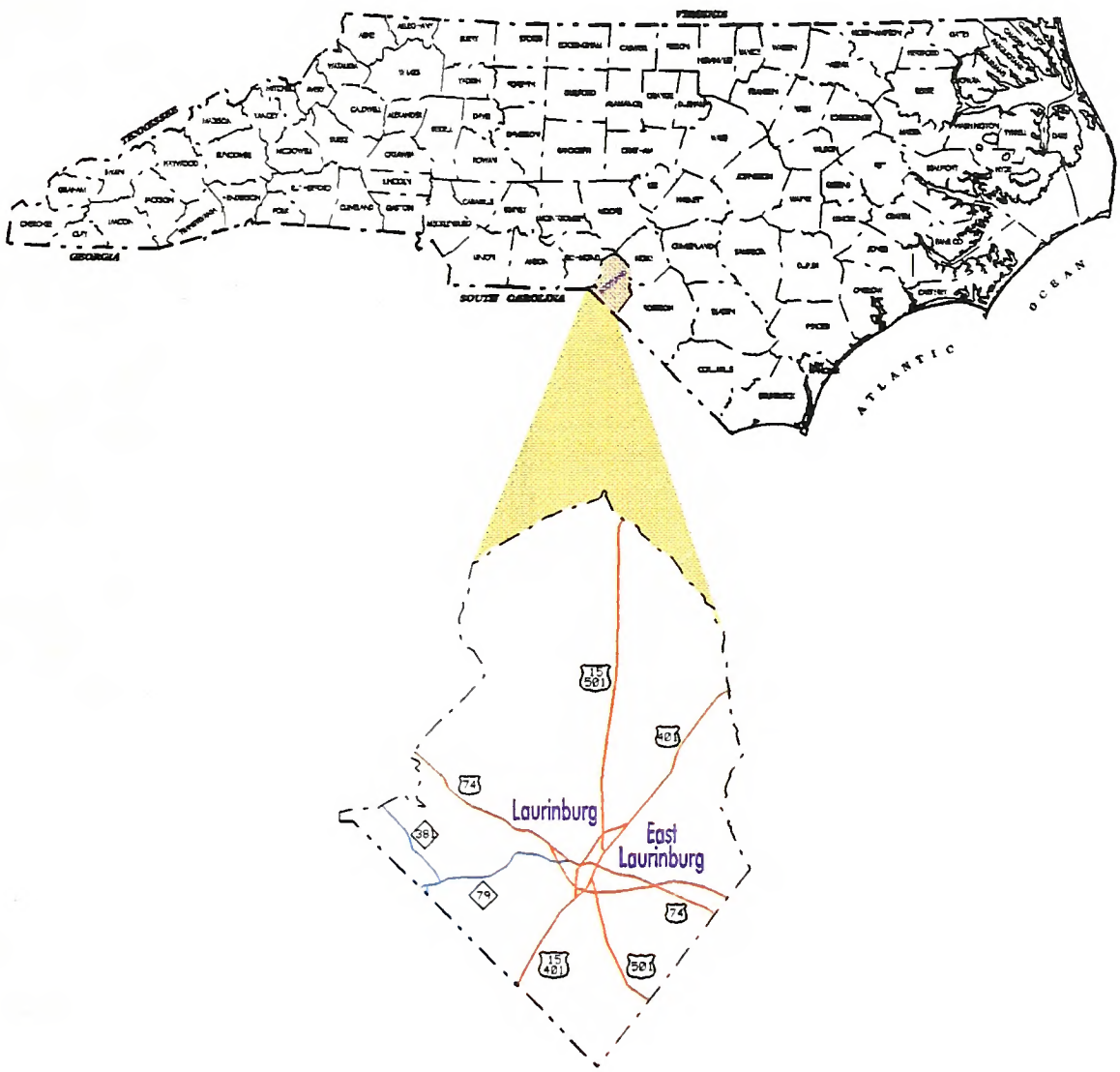
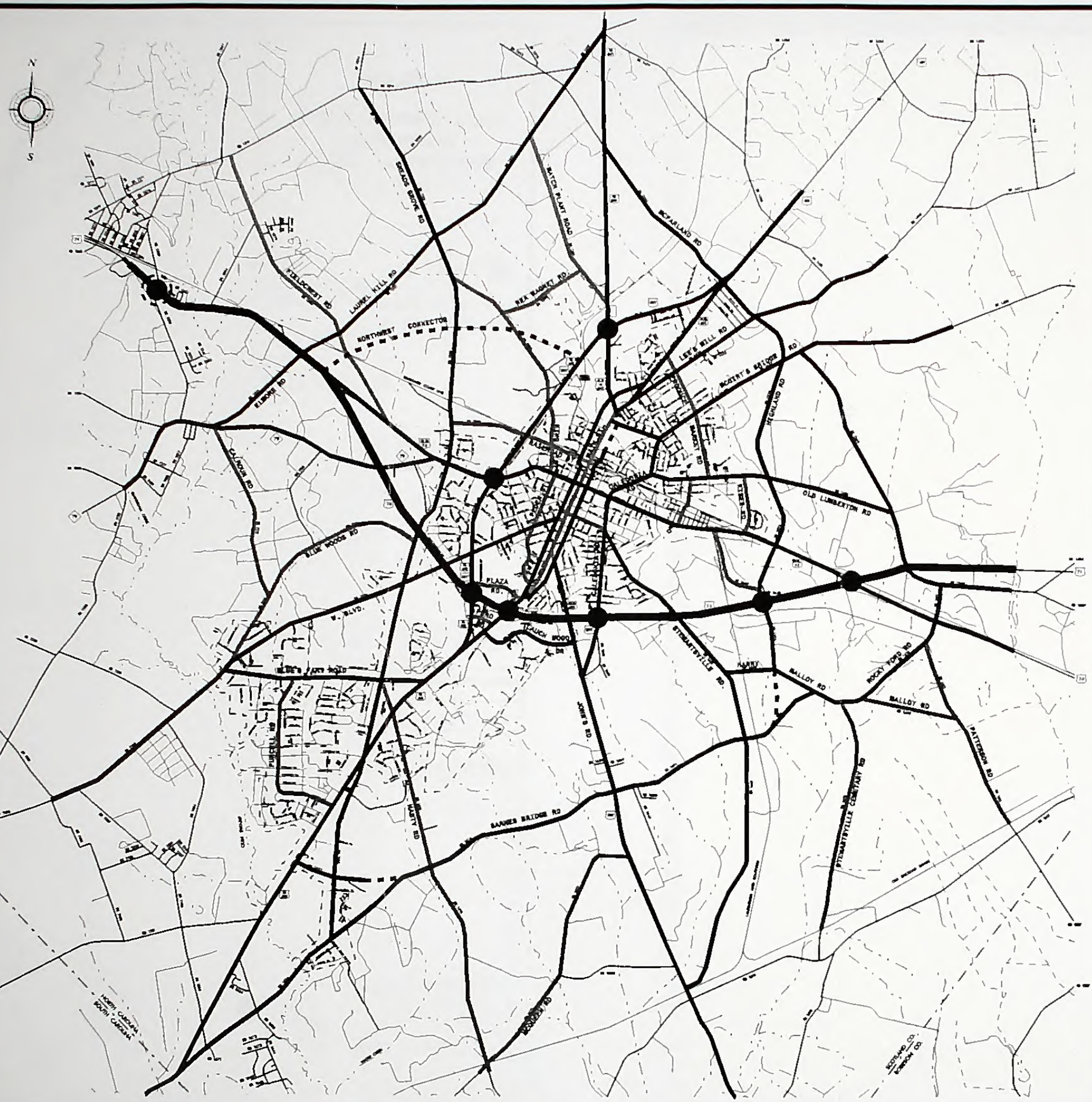


FIGURE 1



LEGEND

	WIDENING	NEW FACILITY
Freeway	———	- - - - -
Major Thoroughfare	———	- - - - -
Minor Thoroughfare	———	- - - - -

	EXISTING	PROPOSED
Interchange	●	◉

ADOPTED BY:

CITY OF LAURINBURG	January 19, 1999
TOWN OF EAST LAURINBURG	April 6, 1999
PUBLIC HEARING	January 19, 1999
RECOMMENDED BY STATEWIDE PLANNING	January 27, 1999
N.C. DEPARTMENT OF TRANSPORTATION	March 4, 1999

March 4, 1999

FIGURE 2

THOROUGHFARE PLAN

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the

North Carolina Department of Transportation
Division of Highways–Statewide Planning Branch

in cooperation with

U.S. Department of Transportation
Federal Highway Administration

0 2000 4000 6000 8000
SCALE IN FEET

BASE: 1995

FIGURE 3

THOROUGHFARE PLAN LAURINBURG – EAST LAURINBURG

MAY 30, 1979

LEGEND

	EXISTING	PROPOSED	LONG RANGE
MAJOR THOROUGHFARES			
FREEWAYS			
OTHER			
MINOR THOROUGHFARES			
GRADE SEPARATION			
INTERCHANGE			

ADOPTED BY LAURINBURG ON AUG. 21, 1979

ADOPTED BY EAST LAURINBURG ON AUG. 7, 1979

RECOMMENDED APPROVAL BY PLANNING & RESEARCH BRANCH ON AUG. 23, 1979

ADOPTED BY N.C. BOARD OF TRANSPORTATION ON SEPTEMBER 4, 1979.

JOINT PUBLIC HEARING JULY 17, 1979.

REVISIONS

ADOPTED BY LAURINBURG	ADOPTED BY EAST LAURINBURG	RECOMMENDED APPROVAL BY PLANNING & RESEARCH BRANCH	ADOPTED BY N.C. BOARD OF TRANSPORTATION
Sept. 20, 1983		Sept. 23, 1983	Nov. 18, 1983

THIS MAP IS A TRUE REPRODUCTION OF THE LAURINBURG, EAST LAURINBURG THOROUGHFARE PLAN DELINEATED ON A 1" = 1000' BASE MAP.

Marion R. Poole DEC. 13, 1983

LAURINBURG
AND VICINITY
SCOTLAND & ROBESON COUNTIES
NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS – PLANNING AND RESEARCH BRANCH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FEBRUARY, 1982

II. Thoroughfare Plan for Laurinburg and East Laurinburg

Intent of the Thoroughfare Plan

Transportation is a major factor affecting a region's economic vitality. Without an adequate transportation system, people cannot easily reach their intended destination, goods cannot be delivered in a cost effective manner, and developers may look to invest in better served regions. Recent trends such as "just-in-time" delivery, increased automobile ownership, and increased migration away from central cities and towns are exhausting existing transportation systems and requiring that more emphasis be placed on planning now for future development.

A thoroughfare plan study identifies existing and future deficiencies in a transportation system, and examines the need for improvements and/or new facilities. A thoroughfare plan outlines the transportation network according to the functional use of each roadway within the system.

This chapter presents recommendations based on the ability of the existing street system to serve existing and anticipated travel desires as the area continues to grow. The recommended plan presents a system of freeways and major and minor thoroughfares to serve the anticipated traffic and land development needs for the Laurinburg/East Laurinburg area. The primary objective of this plan is to reduce traffic congestion and improve safety through the elimination of existing and projected deficiencies in the transportation system.

Recommended Thoroughfare Plan

The recommended thoroughfare plan for Laurinburg and East Laurinburg is presented in **Figure 2**. This plan is comprised of major roadways within the planning area, stratified into the following three classifications:

Interstates/Freeways, which carry high volumes of traffic within and through an area. These facilities are characterized by controlled access; access to other facilities is provided only at interchanges;

Major Thoroughfares, which carry high volumes of traffic within and through an urban area. Access along these facilities varies from limited access to no control of access. Access to these roads should be provided by use of minor thoroughfares or local streets wherever possible. Generally, the majority of trips on major thoroughfares are internal trips, beginning and ending within the planning area; and

Minor Thoroughfares, which collect traffic from local access streets and carry it to major thoroughfares.

Recommended Improvements

The process of determining and evaluating recommendations for those roads comprising the thoroughfare plan involves many considerations, including the goals and objectives of the area, existing roadway properties, identified roadway deficiencies, environmental impacts, and existing and anticipated land development. Consideration of these factors led to the cooperative development of several recommended improvements, which are presented in **Figure 4.** The purpose and need for each recommendation is given below.

Atkinson Street-Biggs Street One-Way Pair

- **Project Recommendation:** It is recommended to modify these two roadways to one-way traffic operation. Atkinson Street is proposed to serve southbound traffic, and Biggs Street is proposed to serve northbound traffic. This improvement would involve extending Biggs Street north along Pine Street, with a portion of new location roadway constructed north of this intersection. Furthermore, Biggs Street would be widened to a cross-section comparable to existing Atkinson Street. The estimated cost of this project is $1,500,000.
- **Transportation Demand:** Currently, the majority of traffic travelling north and south through downtown Laurinburg utilizes Main Street, thereby increasing travel delay along this roadway. The existing cross-section of Main Street provides two travel lanes with parking on either side. Design year traffic projections along this roadway indicate that Main Street will be operating well above its existing capacity by the year 2025. Dense residential and commercial development along Main Street do not lend to either the widening of this facility nor the removal of the on-street parking. The construction of the Atkinson Street/Biggs Street one-way pair would provide an alternative for traffic that would otherwise utilize Main Street.
- **Roadway Capacity and Deficiencies:** North-south traffic capacity through the downtown area would be increased as a result of the one-way pair. The existing capacity of both Atkinson Street and Biggs Street is approximately 12,000 vpd; the one-way pair improvement will result in an increase in capacity for both roadways to approximately 19,000 vpd. This improvement is associated with an overall decrease in the volume-to-capacity ratio (v/c) along Main Street from 1.10 to about 0.20.
- **Safety Issues:** The one-way pair will result in safety benefits for the downtown area. The reduction of vehicular conflicts and left-turns associated with two-way traffic will decrease overall traffic delays as well as the number and severity of crashes. This recommendation is anticipated to result in a $5.2 million decrease in accident costs over the life of the project.
- **Social Demands and Economic Development:** Atkinson Street, Biggs Street, and Main Street traverse the Laurinburg Central Business District (CBD), which is a thriving economic center. However, projections show that, if Main Street is maintained as the dominant route through this area, the travel demand will exceed existing capacity. As a result, the degraded operation along Main Street may possibly hamper the economic potential for the City. By modifying Atkinson Street and Biggs Street to a one-way pair, congestion

along Main Street will be reduced, helping to sustain and possibly improve the economy of the area.

- **Relationship to Other Plans:** The Atkinson Street-Biggs Avenue one-way pair has been included on the Laurinburg/East Laurinburg Thoroughfare Plan since its 1979 inception, and is highly favored by the City.

Church Street (US 74 Business)

- **Project Recommendation:** It is recommended that Church Street be improved from Highland Road to Fieldcrest Road. The proposed cross-section for this project is a three-lane section. The estimated cost of this project is $10,500,000.
- **Transportation Demand:** Church Street is functionally classified as a principal arterial and serves east-west traffic travelling through and within Laurinburg and East Laurinburg. In addition to serving traffic internal to the Laurinburg/East Laurinburg planing area, approximately 20% of the traffic on Church Street are trips traversing the planning area.
- **Roadway Capacity and Deficiencies:** The current ADT on Church Street ranges from 5,400 to 12,800 vpd. The existing traffic in the vicinity of the Main Street intersection already exceeds the present practical roadway capacity of 10,500 vpd. The 2025 projected ADT of 8,700 to 21,100 vpd will result in the section from Caledonia Road to Fieldcrest Road being near or over capacity. With the recommended improvements, the capacity of Church Street will be increased to approximately 16,000 vpd, which will help to accommodate future traffic. Furthermore, these improvements are expected to result in a $19,000,000 reduction in vehicle operating costs over the life of the project.
- **Safety Issues:** Accident data along Church Street indicates a substantial number of crashes, primarily due to turning conflicts. The recommended three-lane section includes an exclusive turning lane, which will help to lessen the potential for crashes along Church Street. This should result in a $1,500,000 reduction in accident costs over the life of the project.
- **Social Demands and Economic Development:** Church Street primarily traverses the downtown area of Laurinburg, an area that is already fully developed. However, the City is expecting substantial economic growth along the eastern US 74 Business corridor, which includes the section of Church Street from NC 79 to Fieldcrest Road. Church Street operates as the major entrance into both Laurinburg and East Laurinburg from the east and west. The recommended improvements will help to improve access into both of these communities, thereby helping to sustain and possibly improve the economies of both.

Eastern Loop

- **Project Recommendation:** It is recommended to provide an eastern bypass of Laurinburg by improving existing portions of Highland Road (SR 1323), Barnes Bridge Road (SR 1614), and Shaw Road (SR 1627), and constructing portions of new roadway connecting both Highland Road and Shaw Road to Barnes Bridge Road. The estimated cost of these improvements is approximately $13,400,000.

- **Transportation Demand:** The Eastern Loop is a recommended major thoroughfare that would serve as a bypass of Laurinburg to the east. This route will help lessen through traffic in the Laurinburg area, specifically along already congested Church Street and Main Street. Furthermore, the Eastern Loop would be available for trucks traveling through the Laurinburg area that currently utilize the US 15-401-501 Business route to access US 74.
- **System Linkage:** The recommended roadway will function as a eastern bypass of downtown Laurinburg.

Lauchwood Road (SR 1674)

- **Project Recommendation:** It is recommended to that Lauchwood Drive be widened from Main Street to John's Road. The proposed cross-section is a two-lane divided roadway, including turn lanes as needed. The estimated project cost is $2,900,000.
- **Transportation Demand:** Lauchwood Drive is functionally classified as an urban collector within the project limits. Scotland County Memorial Hospital is located on Lauchwood Drive, as are numerous private medical facilities. Therefore, the majority of traffic utilizing this road is accessing these facilities.
- **Roadway Capacity and Deficiencies:** The existing capacity along Lauchwood Drive is approximately 11,000 vpd, while the 1996 traffic volumes range from 5,200 vpd to 12,500 vpd. The travel demand is expected to increase over the design period, raging from 7,600 vpd to 17,000 vpd. The recommended cross section will provide additional capacity for existing and projected volumes, and the proposed turning lane will help to reduce crash potential.
- **Safety Issues:** While past accident data along Lauchwood Drive does not reflect a substantial number of crashes, the potential for accidents does exist. The dense development along Lauchwood Drive has led to numerous driveways, which offer the potential for both rear-end and angle accidents. The recommended median-divided cross section will help to control left turns, thereby, reducing the potential for accidents. This should result in a $330,500 reduction in accident costs over the life of the project. Furthermore, the recommended improvements to Lauchwood Drive will increase safety for ambulances accessing Scotland Memorial Hospital.
- **Social Demands and Economic Development:** The City Planning Department has projected moderate growth in both housing and employment in the area just adjacent to Lauchwood Drive. The recommended improvements to Lauchwood Drive will provide additional capacity, thereby helping to accommodate traffic resulting from this projected development.
- **System Linkage:** Lauchwood Drive serves as the only access route to Scotland Memorial Hospital, the major medical facility in Scotland County.

Main Street (US 15-501-401 Business)

- **Project Recommendation:** It is proposed to modify the existing cross-section of Main Street between John's Road and US 74. The existing four

lanes on 44 feet of pavement will be restriped and repaved to include a center turning lane. The estimated cost of this project is $270,000.

- **Transportation Demand:** US 15-401-501 Business is functionally classified as a principal arterial, serving statewide and interstate travel. Within the urban limits of Laurinburg, this principal arterial serves a large portion of trips entering and leaving the area, as well as intra-area travel, such as traffic between the Laurinburg business district and outlying residential areas.
- **Roadway Capacity and Deficiencies:** The current ADT along the subject portion of Main Street is ranges from about 7,100 - 14,000 vpd. Based upon the existing four-lane capacity of 21,100 vpd, Main Street is currently operating at a satisfactory level of service. It is estimated that approximately 9,100 - 20,600 vpd will utilize this roadway by the 2025 design year, indicating that portions of this section of Main Street will still be approaching capacity. The proposed five-lane facility will provide capacity for approximately 27,000 vpd, improving this portion of Main Street to a LOS A.
- **Safety Issues:** Past accident data indicates that four intersections (Plaza Road, Crepe Myrtle Drive, Armory Drive, and Maple Street) along this portion of Main Street have 10 or more reported crashes, primarily due to turning conflicts. The recommended improvements for Main Street should improve safety along this section of roadway. The inclusion of a continuous turning lane will help to minimize potential accidents that are normally associated with turning vehicles, and will make access to adjacent properties safer. Comparisons between the existing and proposed cross-sections result in a $67,000 reduction in accident costs over the life of the project.

Northwest Connector

- **Project Recommendation:** The Northwest Connector is a proposed new-location roadway intended to join US 74 and US 15-401-501. The estimated cost of the recommended two-lane facility is $13,000,000.
- **Transportation Demand:** The Northwest Connector is a recommended major thoroughfare that would serve as a direct route for traffic traveling to the north and east. This route will help lessen through traffic in the Laurinburg area, specifically along already congested Church Street. Furthermore, the Northwest Connector would be an ideal route for trucks traveling through the Laurinburg area that currently utilize the US 74 Business route to access US 15-401-501 Bypass.
- **System Linkage:** The recommended roadway will function as a bypass of downtown Laurinburg for traffic in the northeast quadrant of the planning area.

US 15-401

- **Project Recommendation:** It is recommended that US 15-401 be widened to a multi-lane facility from Turnpike Road south to the South Carolina State line. This improvement is included in the1998-2004 TIP as Project R-2508 as an "identified future need", indicating that a feasibility study has been completed (August, 1990), but the project has not yet been funded. The Feasibility Study recommends a five-lane shoulder section to be contained within existing right-of-way. The estimated project cost is $11,000,000.

- **Transportation Demand:** US 15-401 is functionally classified as a principal arterial within the Laurinburg city limits; the portion located outside the city limits is designated as a minor arterial. Eighty-four percent of the traffic utilizing US 15-401 within the project limits is traffic internal to the planning area, mainly local land access trips. However, the remaining 15% of trips can be attributed to through trips, such as tourist traffic traveling to South Carolina, and external-internal trips, particularly those persons who work at businesses in Laurinburg, but live in South Carolina.
- **Roadway Capacity and Deficiencies:** The existing two-lane cross section of US 15-401 within the project limits has a capacity of approximately 11,000 vpd and serves around 6,500 vpd. The actual travel demand volume is expected to increase to 11,600 vpd, an amount that the existing roadway cross-section will not adequately accommodate. The recommended cross-section will have a practical capacity of around 22,000 vpd, which is sufficient for projected design year traffic volumes.
- **Safety Issues:** The recommended improvements for US 15-401 should improve safety along this roadway. The inclusion of a continuous turning lane will help to minimize potential accidents that are normally associated with turning vehicles, and will make access to adjacent properties safer. Furthermore, the additional travel lanes will allow for faster traveling vehicles to safely pass slower moving travelers, thereby reducing crash potential. Comparisons between the existing and proposed cross-sections result in a $13,000,000 reduction in accident costs if the project were implemented.
- **Social Demands and Economic Development:** The southwestern portion of the planning area is expected to growth significantly in the future. The City Planning Department has projected high growth in housing and businesses, especially along the US 15-401 corridor. In addition to providing additional capacity to accommodate the projected traffic volumes, the recommended widening of US 15-401 may also help to spur further economic development in this area.
- **System Linkage:** US 15-401 plays an important role in the movement of freight, and, therefore, is included in the National Truck Network.
- **Modal Interrelationships:** US 15-401 is designated as part of US Bike Route 1, a national bicycle route which extends north-south from Main to Florida. Due to this designation, bicycle traffic should be expected along US 15-401. The recommended improvements to US 15-401 will improve safety for bicyclists by decreasing vehicular congestion. Coordination with the NCDOT Division of Bicycle and Pedestrian Transportation is recommended prior to the implementation of any improvements.
- **Relationship to Other Plans:** This project has been a recommended improvement associated with the Laurinburg/East Laurinburg Thoroughfare Plan since 1979.

US 74

- **Project Recommendation:** It is recommended that existing US 74 be upgraded to interstate standards from the Proposed Rockingham-Hamlet Bypass (TIP Project R-512) in Richmond County to the US 74 Bypass in

Scotland County. This is included in the 1998-2004 TIP as Project I-3801; a feasibility study has been completed (February, 1998), but the project has not yet been funded. The portion of this project that is within the Laurinburg planning area extends from the US 74 Bypass east of Laurinburg to the western planning area boundary. This project will upgrade the existing four-lane roadway to an interstate route with full control of access. This will involve the construction of an interchange with Springfield Road (SR 1305) and grade separations at Elmore Road/Laurel Hill Road and Groom Road (SR 1304). The estimated cost for this section is approximately $11,500,000.

- **Transportation Demand:** US 74 within the planning area is functionally classified as a principal arterial, predominately serving statewide and interstate travel. US 74 is an east-west route running though the southern portion and the mountains of North Carolina. US 74 connects major areas such as Asheville, Gastonia, Charlotte, and Wilmington. Once completed, this project will accommodate a portion of the proposed Interstate 74 corridor, which will traverse Illinois, Indiana, Kentucky, West Virginia, North Carolina, and South Carolina. The portion of the interstate within North Carolina will help improve the transportation link between Charlotte and Wilmington.
- **Roadway Capacity and Deficiencies:** The present ADT on US 74 in the planning area is approximately 19,000 vpd. The existing four-lane section provides practical capacity for 21,000 vpd, therefore, US 74 is currently operating at an acceptable level of service. However, the design year travel demand volume along US 74 is estimated to be around 41,500 vpd, which would cause the facility to exceed its current practical capacity. The capacity of the improved facility will be approximately 54,000 vpd, which will handle the anticipated travel demand at level of service C or better.
- **Safety Issues:** A large portion of the benefits of this project can be attributed to the restriction of access to grade separations or interchanges. The greatest safety of intersections is obtained through the use of interchanges. Accident-prone intersections are commonly found at the intersections of comparatively lightly-traveled roadways in more rural areas where speeds are high, as is the case with the numerous at-grade intersections of various state routes with US 74 in the project area. Overall, the recommended improvements to US 74 will produce approximately an $86,000,000 reduction in accident costs over the life of the project.
- **Social Demands and Economic Development:** The northwestern portion of the planning area is not expected to grow significantly in the future, however, the City of Laurinburg Planning Department projects high business growth within the US 74 corridor. In addition to providing an interstate link with adjacent cities and states, the recommended improvements may also help to spur further economic development in this area.
- **System Linkage:** The recommended improvements to US 74 within the planning area are an element of a larger TIP Project, R-3333, which extends from the Proposed Rockingham-Hamlett Bypass in Richmond County to the US 74 Bypass in Scotland County. This project is an integral step to the completion of Interstate 74 throughout North Carolina. US 74 is included in the North Carolina Intrastate Highway System. The Intrastate System is

designed to provide safe, high-speed travel service throughout the State, to support the statewide balanced growth policy, to connect major areas within the State, to provide connectivity to major highways in adjoining states, and, ultimately, to provide for safe and efficient freight distribution within and through North Carolina. In addition, US 74 is included as part of the National Truck Network.

- **Relationship to Other Plans:** The western portion of TIP Project I-3801 extends into the Rockingham-Hamlett planning area. The Thoroughfare Plan (adopted April, 1996) does include US 74, but does not include the improvements associated with this project.

US 401

- **Project Recommendation:** It is recommended that US 401 be widened to a multi-lane facility from US 401 Business in Laurinburg to US 401 Business east of Raeford. This project is included in the 1998-2004 Transportation Improvement Program (TIP) as Project R-3333. The current schedule for this project estimated planning from 1998-2001, design from 2001-2004, and construction sometime after the year 2004. The portion of the project that is within the planning area extends from the US 401 Bypass/Business split approximately 1.1 miles to the planning area boundary. The recommended cross section for this section is a four-lane, divided, shoulder section with 12-foot wide travel lanes, a 46-foot wide median, 2-foot wide inside paved shoulders, and 8-foot wide outside shoulders which include 2 feet paved. A 250-foot wide right-of-way is recommended for this cross-section. The estimated cost for this portion of TIP Project R-3333 is $2,900,000.
- **Transportation Demand:** US 401 is functionally classified as a principal arterial, primarily serving statewide and interstate travel. It is a north-south route traversing the eastern part of the state, and, in the Laurinburg planning area, serves as a direct connection to cities such as Fayetteville and Raleigh.
- **Roadway Capacity and Deficiencies:** The current average daily traffic (ADT) along the subject portion of US 401 is about 6,600 vehicles per day (vpd), 6% of which is comprised of trucks. Based upon the existing two-lane capacity of 11,300 vpd, US 401 is currently operating at a satisfactory level of service (LOS). It is estimated that approximately 15,500 vph will utilize US 401 by the 2025 design year, indicating that this section of US 401 will be operating over capacity. The proposed four-lane facility will provide capacity for approximately 28,000 vpd, improving the level of service to A.
- **Safety Issues:** While frequent crashes have not been prevalent along US 401 within the planning area, US 401 within the limits of TIP Project R-3333 is reported to have an accident rate of 93 accidents per 100 million vehicles miles. The recommended cross-section will offer the potential for reduction in rear-end, left-turn, and angle accidents, which are common along two-lane roadways. For the portion of US 401 within the planning area, this will decrease overall accident costs by an estimated $3,500,000.
- **Social Demands and Economic Development:** The northeastern portion of the planning area is not expected to growth significantly in the future, however, the City of Laurinburg Planning Department projects high employment growth within

the US 401 corridor. In addition to accommodating the expected traffic volume increase, the recommended improvements may also help to spur further economic development in this area.

- **System Linkage:** The recommended improvements to US 401 within the planning area are a part of a larger TIP Project, R-3333, with project limits from US 401 Business in Laurinburg to US 401 Business in Raeford. Since US 401 is significant for serving intercounty travel, it is important that the highway be kept is good operating condition. Also, US 401 is integral to truck transportation, and is, therefore, included in the National Truck Network.
- **Modal Interrelationships:** US 401 in Scotland County is designated as part of US Bike Route 1, which runs from Main to Florida. Due to this designation, bicycle traffic should be expected along US 401. The recommended improvements to US 401 in the planning area will improve safety for bicyclists by decreasing vehicular congestion. Coordination with the NCDOT Division of Bicycle and Pedestrian Transportation is recommended prior to the implementation of any improvements.
- **Relationship to Other Plans:** The multilane widening of US 401, TIP Project R-3333, also impacts Hoke County, Scotland County, and the Town of Raeford. The Scotland County Thoroughfare Plan, adopted February, 1982, and the Town of Raeford Thoroughfare Plan, adopted November, 1997, include improvements to US 401. Currently, there is no thoroughfare plan for Hoke County.

Other Recommendations

Widening Projects

The following projects are recommended to be widened to improve safety and capacity. Each of the sections of roadway listed below currently has lane widths less than 12 feet and, based upon the volume of traffic on the road, is recommended to be widened to two 12-foot lanes. Prior to any roadway improvements, the NCDOT Division of Bicycle and Pedestrian Transportation should be consulted on the most appropriate cross-section.

- **Aberdeen Road (US 15-501 Business),** from the Laurinburg City Limits to south of US 15-401 Bypass;
- **Blues Farm Road (SR 1117),** from McColl Road east for a distance of approximately 3.01 km;
- **Blues Woods Road (SR 1116),** from X-Way Road to Lytch Drive;
- **Caledonia Road (SR 1438),** from the railroad crossings to Church Street;
- **Calhoun Road (SR 1119),** from Blues Woods Road to NC 79;
- **Dixie Guano Road (SR 1645),** from Highland Road east for a distance of approximately 0.6 miles;
- **Elmore Road (SR 1321),** from US 74 to NC 79;
- **Harry Malloy Road (SR 1609),** from Stewartsville Road to Rock Ford Road;
- **Hasty Road (SR 1615),** from the planning area boundary to the existing City Limit and from US 15-501 to Turnpike Road;
- **Kiser Road (SR 1452),** from Church Street to Old Lumberton Road;

- **Laurel Hill Road (SR 1321),** from Old Wire Road to US 74;
- **Lees Mill Road (SR 1425),** from Produce Market Road to US 401 Business;
- **McArn Road (SR 1369),** from Old Lumberton Road to Caledonia Road;
- **McGirt's Bridge Road (SR 1438),** from the eastern planning area boundary to east of McArn Road;
- **Old Lumberton Road (SR 1438),** from Caledonia Road to McArn Road;
- **Produce Market Road (SR 1439),** from Wagram Road to Old Lumberton Road;
- **Railroad Street (SR 1383),** from Turnpike Road to Gill Street;
- **Rocky Ford Road (SR 1610),** from S. Rocky Ford Road to Harry Malloy Road;
- **S. Rocky Ford Road (SR 1611),** from Rocky Ford Road to US 74 Business;
- **Sneads Grove Road (SR 1105),** from Wire Road to King Street;
- **Stewartsville Road (SR 1601),** from US 74 Bypass to John's Road;
- **Turnpike Road (SR 1105),** from Patterson Circle to Blues Woods Road and from W. Boulevard to south of US 15-401;
- **US 74 Business,** from the eastern planning area boundary to US 74 Bypass and from Highland Road to US 74 Bypass;
- **Wagram Road (US 401 Business),** from Aberdeen Road to US 401; and
- **X-Way Road (SR 1108),** from Turnpike Road to the eastern planning area boundary.

Traffic Separation Study

In order to address the concerns of the City regarding the numerous railroad crossings in the study area, it is recommended that the NCDOT Rail Division conduct a Traffic Separation Study of the crossings in the Laurinburg/East Laurinburg area.

Construction Priorities, User Benefits, & Cost Estimates

The recommended improvements for the Laurinburg/East Laurinburg Thoroughfare Plan, as shown in **Figure 4**, cannot be undertaken all at once, nor should they be. The need for improvements is determined based on traffic projections for the 2025 design year, and these improvements should be progressively developed over the planning period. Therefore, improvement projects must be prioritized in order of importance to the City to accomplish realistic scheduling. In an effort to provide a common denominator with which to compare the recommendations of the Laurinburg/East Laurinburg Thoroughfare Plan, an assessment of the benefits expected from implementing each improvement was made. These benefits and the costs associated with each were then used along with local input as a guide in prioritizing projects.

Three principal measures were established to estimate the benefits derived from each improvement: road user cost savings; potential for increased economic development resulting from the improvement; and the positive and negative environmental impacts which may result. Road user cost savings is an actual estimate of monetary savings, while the other two measures are merely estimates of the probability of the resulting change.

Reduced road user costs should result from roadway improvements, such as a simple widening or the construction of a new roadway. For each recommendation, the existing and proposed facilities were compared based on vehicle operating costs, travel time costs, and accident costs. These user benefits were computed as total dollar savings over the twenty-five year design period, using data such at project length, base year and design year traffic volumes, traffic speed, facility type, and volume-to-capacity ratio.

The impact of a project on economic development potential is denoted as the probability that the improvement will stimulate the economic development of an area by providing access to land with development potential and reducing transportation costs. This subjective estimate was based on the knowledge of the proposed project, local development characteristics, and land development potential. The probability was rated on a scale from 0.00 (none) to 1.00 (excellent). **Table 1** presents the probability estimation guide that was used for the benefit analysis.

Table 1. Probability Estimation Guide

Subjective Evaluation	Impact Probability
Excellent - very substantial	1.00
Very Good - substantial	0.75
Good - considerable	0.50
Fair - some	0.25
Poor - none	0.00

The environmental impact analysis considered the effect of improvement projects on the physical, social and cultural, and economic environmental. Many of these effects were included in the evaluation of the project with respect to user benefits, costs, and economic development potential; however, thirteen additional environmental factors were considered. These additional factors are as follows: air quality, water resources, soil and geology, wildlife, vegetation, neighborhoods, noise, educational facilities, churches, parks and recreational facilities, historic sites and landmarks, and aesthetics. The compilation of the positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impact of a project. **Table 2** lists all of the environmental considerations that were analyzed during the development of the Laurinburg/East Laurinburg Thoroughfare Plan. Some of these environmental issues are discussed in Chapter VI of this report.

The benefits that may be derived from a roadway improvement project would be offset by the actual cost of constructing the facility. A new roadway may prove to be unjustified by the excessive construction costs, despite any projected benefits. The highway costs estimated in this report were based on the average statewide construction costs for similar type projects. In additional, anticipated right-of-way costs were also estimated. **Table 3** presents the results of the user benefits,

estimated costs, probability of economic development, and environmental impacts evaluation for each of the recommended improvements.

Table 2. Environmental Considerations

Physical Soils and Geology	Social / Cultural Environment	Economic Environment
• Air Quality • Water Resources • Soils & Geology • Wildlife • Vegetation	• Housing & Neighborhoods • Noise • Educational Facilities • Churches • Parks & Recreational Facilities • Historic Sites & Landmarks • Public Health & Safety • National Defense • Aesthetics	• Businesses • Employment • Economic Development • Public Utilities • Transportation Costs • Capital Costs • Operation & Maintenance Costs

Table 3. Cost Estimates, Benefits, And Probable Impacts										
		Length	Project Costs			User	Benefits/	Economic	Environmental Impacts	
	Project Description	(km)	Construction	ROW	Total	Benefits	km	Dev. Pot	Positive	Negative
					FIRST PRIORITY					
1	US 401 Widening (TIP R-3333)	2.97	$2,629,000	$305,000	$2,934,000	$8,125,000	$2,735,690	0.02	0.31	0.08
2	US 74 Upgrade (TIP I-3801)	2.10	$6,760,000	$4,740,000	$11,500,000	$112,481,000	$53,562,381	0.25	0.23	0.15
3	US 15-401 (TIP R-2508)	5.07	$11,025,000	$0	$11,025,000	$49,823,000	$9,827,022	0.13	0.31	0.08
					SECOND PRIORITY					
4	Church St Widening	4.09	$10,405,000	$132,500	$10,537,500	$21,479,000	$5,251,589	0.02	0.31	0.15
5	Main Street Resurfacing/Restriping	1.35	$273,000	$0	$273,000	$349,000	$258,519	0.02	0.31	0.15
6	Atkinson St-Biggs St One-Way Pair	3.98	$1,575,000	$727,000	$2,302,000	$49,420,000	$12,417,085	0.19	0.38	0.08
7	Lauchwood Dr Widening	1.05	$2,299,000	$0	$2,299,000	$2,670,000	$2,542,857	0.32	0.31	0.00
					THIRD PRIORITY					
8	Northwest Connector	2.8	$13,224,000	$140,000	$13,364,000	$21,378,000	$7,635,000	0.13	0.46	0.31
9	Eastern Loop	10.5	$13,392,000	$779,000	$14,171,000	$34,485,000	$3,284,286	0.00	0.31	0.00

N

S

R - 3801

R - 3333

R - 2508

LEGEND

	WIDENING	NEW FACILITY
TIP Project (Project Number denoted in red)		
One-Way Pair		
Improvement		

No Widening - Restripe with turn lane

FIGURE 4

2025 RECOMMENDED IMPROVEMENTS

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the

North Carolina Department of Transportation
Division of Highways-Statewide Planning Branch

in cooperation with

U.S. Department of Transportation
Federal Highway Administration

0 2000 4000 6000 8000

SCALE IN FEET

BASE: 1995

III. IMPLEMENTATION

Implementation is a critical aspect of the thoroughfare planning process. If the recommendations of the plan are not actively pursued, the effort and expense associated with the development of the plan are wasted. Neglect of the implementation process is a three-fold loss: the loss of the capital expenditures used to develop the plan; the opportunity cost of the capital expenditures; and the loss of the benefits which would accrue from an improved transportation system.

There are several administration controls and implementation tools that will aid the implementation of the thoroughfare plan. These are generally mandated through Federal and State legislation, and include the following: Mutual Adoption of the Thoroughfare Plan; Subdivision Regulations; Roadway Corridor Official Map; Zoning Ordinances; Urban Renewal; Capital Improvements Program; and Development Reviews.

State and Municipal Adoption of the Thoroughfare Plan

Chapter 136, Article 3A, Section 136-66.2 of the General Statutes of North Carolina provides that after development of a Thoroughfare Plan, the Plan may be adopted by the governing body of the municipality and the Department of Transportation to serve as the basis for future street and highway improvements. After mutual adoption, negotiations will begin to determine which of the existing and proposed thoroughfares will be Department of Transportation responsibilities and which will be municipal responsibilities.

In general, facilities which serve through traffic and traffic from outside the area to major business, industrial, governmental, and institutional destinations located inside the municipality are designated a State responsibility. These facilities will be constructed and maintained by the Division of Highways; however, the Municipality may share in the right-of-way costs. This share of costs will be determined at the time of construction. Facilities which primarily serve internal travel are designated a municipal responsibility, and shall be constructed and maintained by the municipality.

Administrative controls and implementation methods that can aid in the implementation process are generally available to municipalities through Federal and State legislation. These include, but are not limited to, subdivision regulations, zoning ordinances, official maps, urban renewal, capital improvement programs, and development reviews. Generally, available finances and citizen involvement play a major role in the implementation process; effective use of the aforementioned controls and methods can help to maximize expenditure of funds and minimize negative citizen reaction to specific elements of the plan.

Subdivision Regulations

Subdivision regulations are locally adopted laws which govern how a developer may divide land into building sites. Each developer is required to submit a plat of the proposed subdivision to the municipality for approval before a building permit will be issued. Through this process, it is possible to reserve or protect the necessary right-

of-way for streets which are a part of the thoroughfare plan and to require subdivision streets to conform to the plan. The construction of subdivision streets to adequate standards will reduce maintenance costs and facilitate the transfer of the streets to the State Highway System. **Appendix D** outlines the recommended subdivision design standards as they pertain to road construction.

Roadway Corridor Official Map

North Carolina General Statutes 136-44.50 through 133-44.53 are collectively designated as the "Roadway Corridor Official Map Act". The roadway corridor official map, more commonly referred to as an official street map, is a document adopted by the legislative body of the community that pinpoints and preserves the location of proposed streets against encroachment. In effect, the official map serves notice on developers that the State or municipality intends to acquire certain specific property. The official map serves as a positive influence for sound development by reserving sites for public improvements in anticipation of actual need.

The NCDOT limits its use of official maps to large scale, fully controlled access facilities planned for developing areas outside of municipal jurisdictions. For projects within municipal jurisdictions, official maps should be prepared and adopted by the local government.

For cities contemplating the adoption of a Roadway Corridor Official Map, more commonly referred to as an Official Street Map, there are several issues to consider. First and foremost, it should be recognized that an Official Street Map designation places severe, but temporary, restrictions on private property rights. These restrictions are in the form of a prohibition of the issuance of building permits on subdivision property lying within an Official Street Map corridor for a period of up to three years, commencing with the development approval request. This authority should be used carefully and only in cases where less restrictive powers will be ineffective.

The Program and Policy Branch of the North Carolina Department of Transportation is responsible for facilitation the adoption of Roadway Official Corridor Maps. Municipalities considering Official Street Map projects should contact this Branch for their "Guidelines for Municipalities Considering Adoption of Roadway Corridor Maps" at:

NC Department of Transportation
Program Development Branch
P. O. Box 25210
Raleigh, NC 27611

Zoning Ordinances

A zoning ordinance can be beneficial to thoroughfare planning by designating appropriate locations of various land uses and allowable densities of residential development. This provides a degree of stability on which to project future traffic and plan streets and highways. Other benefits of a good zoning ordinance include the

establishment of standards of development which will aid traffic operations on major thoroughfares and the minimization of strip commercial development, which creates traffic friction and increases the traffic accident potential.

Urban Renewal

Urban renewal helps to rehabilitate downtown areas by demolishing, remodeling, or rehabilitation of existing structures in accordance with comprehensive plans. This process allows for corrections to basic problems in the street system layout and design.

To qualify for community development funds or discretionary funds for urban renewal, a municipality must first prepare a community development program. Urban areas compete throughout the State on the basis of demographic points which consider such conditions as percent of substandard housing, people per square feet of housing, dwelling age, etc. An effort should be made to ensure that community development and transportation plans are compatible.

Capital Improvements Program

One of the tools which makes it easier to build a planned thoroughfare system is a Capital Improvements Program. This is a long range budget for street improvements, acquisition of right-of-way, and other capital improvements on the basis of projected revenues. Municipal funds should be available for construction of street improvements which are a municipal responsibility, right-of-way cost sharing on facilities designated a Division of Highways responsibility, and advance purchase of right-of-way where such action is required.

The improvement groupings given in **Table 3** provides a basis by which the City of Laurinburg and Town of East Laurinburg can develop their Capital Improvements Program. This program could be used to benefit any of the existing and proposed local thoroughfares listed in this plan.

Development Reviews

Driveway access to a State-maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation prior to access being permitted. Any development expected to generate large volumes of traffic (i.e. shopping centers, fast food establishments, larger industries, etc.) may be comprehensively studied by staff from the Traffic Engineering, Statewide Planning, and Roadway Design Branches of NCDOT. If completed at an early stage, the development's accessibility may be significantly improved at minimal expense. Since the municipality is the first point of contact for the developer, it is important that the municipality advise them of this review requirement and cooperate in the review process.

Other Funding Sources

1. Assess user impact fees to fund transportation projects. These fees, called "facility fees" in the legislation, are to be based upon "reasonable and uniform

considerations of capital costs to be incurred by the town as a result of new construction. The facility fee must bear a direct relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process".

2. Enact a bond issue to fund street improvements.

3. Work with NCDOT to have local projects included in the Transportation Improvement Program (TIP). North Carolina's TIP is a document which lists all major construction projects planned by the NCDOT for the next seven years. Similar to local Capital Improvement Program Projects, TIP Projects are matched with projected funding sources. With each biennial update of the TIP, completed projects are removed, programmed projects are advanced, and new projects are added. Municipalities have the opportunity to request projects during the TIP public hearings held during the development process.

4. Consider the possibility of specific projects qualifying for federal demonstration project funds.

5. Adopt a collector street plan that would assess buyer or property owners for street improvement.

6. Request Industrial Access Funds. If an industry wished to develop property that does have access to a state maintained roadway and certain economic conditions are met, the funds may be available for construction of an access road. Inquiries regarding these funds should be directed to the NCDOT Secondary Roads Office.

7. Request Small Urban Funds. Small Urban Funds are annual discretionary funds distributed municipalities with qualifying projects, with a maximum $300,000 awarded per project per year. Requests for Small Urban Fund assistance should be directed to the appropriate Board of Transportation Member and Division Engineer.

VI. TRAVEL DEFICIENCY ANALYSIS OF EXISTING SYSTEM

An important stage in the development of a thoroughfare plan is the analysis of the existing street system and its ability to serve the area's travel desires. Emphasis is placed not only on detecting the existing deficiencies, but also on understanding the causes of these deficiencies. Travel deficiencies may be localized, resulting from problems with roadway design or intersection geometry. Travel deficiencies may result due to system problems, such as the need to construct missing travel links, bypass routes, loop facilities, or additional radial routes.

An analysis of the roadway system looks at both current and future travel patterns and identifies existing and anticipated deficiencies. This is usually accomplished through a traffic accident analysis and roadway capacity deficiency analysis.

Traffic Accident Analysis

Traffic accidents or "crashes" are often used as an indicator for locating congestion problems. While often the result of drivers or vehicle performance, crashes may also be a result of the physical characteristics of the roadway. Things such as roadway conditions and obstructions, traffic conditions, and weather may lead to a crash. While some crashes are merely the fault of the driver, others may be prevented with physical design changes or traffic control changes, such as the installation of stop signs or traffic signals.

Crash data for the period from January, 1995 to December, 1997 was studied as part of the development of this report. Intersections having 10 or more crash incidents are shown in **Figure 5**, and **Table 4** presents the number and predominant type of crashes at each location.

Table 4. Intersections Having 10 Or More Reported Crashes*

Map Index	Intersection	Predominant Type	Total
1	Main Street at Ford Street	Angle	20
2	Main Street at Plaza Road	Rear End	19
3	Main Street at Crepe Myrtle Drive	Angle	17
4	US 15-401 at W. Boulevard	Turning Conflict	17
5	Main Street at Armory Drive	Rear End	16
6	Caledonia Road at Church Street	Angle	15
7	Main Street at Lauchwood Drive	Turning Conflict	15
8	Main Street at Church Street	Angle	14
9	Blues Farm Road at Turnpike Road	Angle	13
10	Lees Mill Road at Produce Market Road	Angle	13
11	Main Street at Maple Street	Rear End	13
12	Aberdeen Street at Gill Street	Angle	12
13	Biggs Avenue at Church Street	Angle	12
14	Atkinson Street at Church Street	Angle	11
15	Atkinson Street at Crepe Myrtle Drive	Angle	11
16	Main Street at Hillside Street	Rear End	11
17	Caledonia Road at E. Vance Street	Angle	10
18	US 15-401 at Plaza Road	Turning Conflict	10

*Accidents compiled for the January, 1995 - December, 1997 period

The NCDOT Division is actively involved with investigating and improving many of these locations. To request a more detailed analysis for any of the locations listed in **Table 4**, or other intersections of concern, the City should contact the Division Traffic Engineer.

Roadway Capacity Deficiencies

Roadway capacity deficiencies occur wherever the travel demand volume of a roadway is close to or more than the capacity of that roadway. *Travel demand volume* is the total number of vehicles that wish to use a roadway on a daily basis. The existing travel demand volumes for the planning area are based upon traffic count data taken by the NCDOT Traffic Surveys Unit in 1996 and are shown in **Figure 6**. The projected 2025 travel demand volumes, which are based upon historic and anticipated population, economic growth patterns, and land use trends, are shown in **Figure 7**.

Capacity is the maximum number of vehicles that can pass over a given section of roadway during a given time period under prevailing roadway and traffic conditions while still maintaining a service level that is acceptable to drivers. Many factors contribute to the capacity of a roadway, including:

- Geometry of the road, including number of lanes, horizontal and vertical alignment, and proximity of perceived obstructions to safe travel along the road;
- Typical users of the road, such as commuters, recreational travelers, and truck traffic;
- Access control, including streets and driveways, or lack thereof, along the roadway;
- Development of the road, including residential, commercial, and industrial developments;
- Number of traffic signals along the route;
- Peaking characteristics of the traffic on the road;
- Characteristics of side-roads feeding into the road; and
- Directional split of traffic or the percentages of vehicles traveling in each direction along a road at any given time.

The relationship of travel demand volume to roadway capacity determines the level-of-service (LOS) of a roadway. Six distinct levels-of-service are possible, with letter designations ranging from **LOS A**, which represents the best operating conditions, to **LOS F**, which represents the worst operating conditions. **LOS D** indicates "practical capacity" of a roadway, or the capacity at which the public begins to express dissatisfaction. The six levels of service are illustrated in **Figure 8**.

Design requirements for thoroughfares vary according to the desired capacity and level-of-service. Recommended improvements and overall design of the Thoroughfare Plan were based upon achieving a minimum LOS D on existing facilities and a LOS C on new facilities.

1996 Traffic Capacity Analysis

The comparison of the 1996 travel demand volumes for the major roadways in the Laurinburg area to the current practical capacities for these roadways identified several existing deficiencies in the Laurinburg/East Laurinburg planning area. These existing roadway deficiencies are summarized in **Table 5.**

Table 5. 1996 Capacity Deficiencies	
Church Street (US 74 Bus)	
From Fieldcrest Road (SR 1303) to US 15-401-501 Byp	Approaching capacity
From Main Street to Caledonia Street (SR 1438)	Approaching capacity
Main Street (US 15-401-501 Bus)	
From Church Street to Vance Street	Approaching capacity
McColl Road (US 15-401)	
From US 15-401 Byp to Blues Farm Road (SR 1117)	Approaching capacity
US 74	
From WPAB to US 74 Bus/Byp split	Approaching capacity

2025 Traffic Capacity Analysis

The capacity deficiency analysis for the 2025 design year is based upon the "no build" alternative. This analysis examined the existing street system and determined that numerous roadways within the planning area will exceed practical capacity by the design year. **Table 6** presents the capacity deficiencies determined for the design year based upon this analysis. Complete recommendations for these facilities are included in Chapter 2 of this report.

Table 6. 2025 Capacity Deficiencies	
Roadway/Section	**Deficiency**
Church Street (US 74 Bus)	
From US 74 split to Fieldcrest Road (SR 1303)	Approaching capacity
From Fieldcrest Road (SR 1303) to US 15-401-501 Byp	Over capacity
From US 15-401-501 Byp to King Street (SR 1300)	Approaching capacity
From King Street to McLaurin Avenue	Over capacity
From McLaurin Avenue to Main Street	Approaching capacity
From Main Street to Caledonia Street (SR 1438)	Over capacity
From Kiser Road to Highland Road (SR 1323)	Approaching capacity
From Highland Road to EPAB	Over capacity
Lauchwood Drive (SR 1674)	
From Main Street (US 15-401-501 Bus) to Medical Drive	Over capacity
Main Street (US 15-401-501 Bus)	
From McGirt's Bridge Road (SR 1471) to Cronly Street	Approaching capacity
From Cronly Street to Vance Street	Over capacity
From US 74 Byp to Lauchwood Drive (SR 1674)	Over capacity
From US 15-501 Byp to Sycamore Drive	Over capacity

Table 6. 2025 Capacity Deficiencies (Cont'd)	
McColl Road (US 15-401)	
From Sycamore Drive to Turnpike Road (SR 1105)	Approaching capacity
From Purcell Road (SR 1777) to Academy Road (SR 1101)	Over capacity
From Academy Road (SR 1101) to Leisure Road (SR 1628)	Approaching capacity
X-way Road (SR 1108)	
From Bostic Rd. (SR 1104) to Blues Farm Rd. (SR 1117)	Approaching capacity
From Lytch Drive to Pelham Road	Approaching capacity
From Pelham Road to US 15-401 Byp	Over capacity
US 15-401 Bypass	
From Lauchwood Dr. to Main St. (US 15-401-501 Bus)	Approaching capacity
US 15-501	
From NPAB to Old Wire Rd (SR 1319)	Approaching capacity
From Railroad to US 15-401-501 Byp	Approaching capacity
US 74	
From WPAB to US 74 Bus/Byp split	Over capacity
US 401	
North of the US 401 Bus/Byp split	Over capacity
US 501	
From US 501 Byp to Barnes Bridge Road (SR 1614)	Approaching capacity

Bridge Conditions

Bridges are an important element of a highway system. Any bridge deficiency will affect the efficiency of the entire transportation system. In addition, bridges present the greatest opportunity of all potential highway failures for disruption of community welfare and loss of life. Therefore, bridges must be constructed to the same, or higher, design standards as the system of which they are a part, and must be inspected regularly to ensure the safety of the traveling public.

All bridges in North Carolina are inspected at least once every two years by the NCDOT Bridge Maintenance Unit. A sufficiency rating for each bridge is calculated and establishes the eligibility and priority for replacement. Bridges having the highest priority are replaced as Federal and State funds become available.

A bridge is considered deficient if it is either *Structurally Deficient* or *Functionally Obsolete*. A bridge at least ten years old is considered structurally deficient if it is in relatively poor condition or has insufficient load-carry capacity, due to either the original design or to deterioration. The bridge is considered to be functionally obsolete if it is narrow, has inadequate under-clearances, has insufficient load-carrying capacity, is poorly aligned with the roadway, and can no longer adequately serve existing traffic. A bridge must be classified as deficient in order to qualify for Federal replacement funds. In addition, the bridge must have a certain sufficiency rating to qualify for these funds. To qualify for replacement, the sufficiency rating must be less than 50%; for rehabilitation, the sufficiency rating must be less than 80%. Deficient bridges within the planning area are given in **Table 7**; the location of these bridges is shown in **Figure 9**.

Table 7. Structurally Deficient & Functionally Obsolete Bridges Located within the Planning Area

Bridge Number	Location	Sufficiency Rating	Year Built	Remaining Life
28	SR 1433 over Juniper Creek	28.4	1951	6 years
17	US 15-401 over Gum Swamp	31.0	1938	1 years
30	SR 1425 over Juniper Creek	40.1	1951	15 years
45	Westbound US 74 over US 15-401-501	64.0	1964	10 years
57	Eastbound US 74 over Southern Railroad	72.1	1964	25 years
49	Eastbound US 74 over US 15-401 Business	72.2	1965	30 years
42	Eastbound US 74 over US 15-401-501	74.2	1964	25 years
60	Westbound US 74 over Southern Railroad	75.1	1964	25 years
94	Eastbound US 74 over US 74 Business & CSX Railroad	93.5*	1983	40 years
103	Northbound US 15-401-501 over US 74 Business-NC 79	94.0*	1996	50 years

* This is a Functionally Obsolete bridge based upon Structural Evaluation, Deck Geometry, Vertical/Horizontal Under-Clearance, Waterway Adequacy, and/or Approach Roadway Alignment. However, this bridge **does not qualify** for either rehabilitation nor replacement.

LEGEND

- Crash Location
- # Corresponds to Table 4

FIGURE 5

Crash Locations

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the

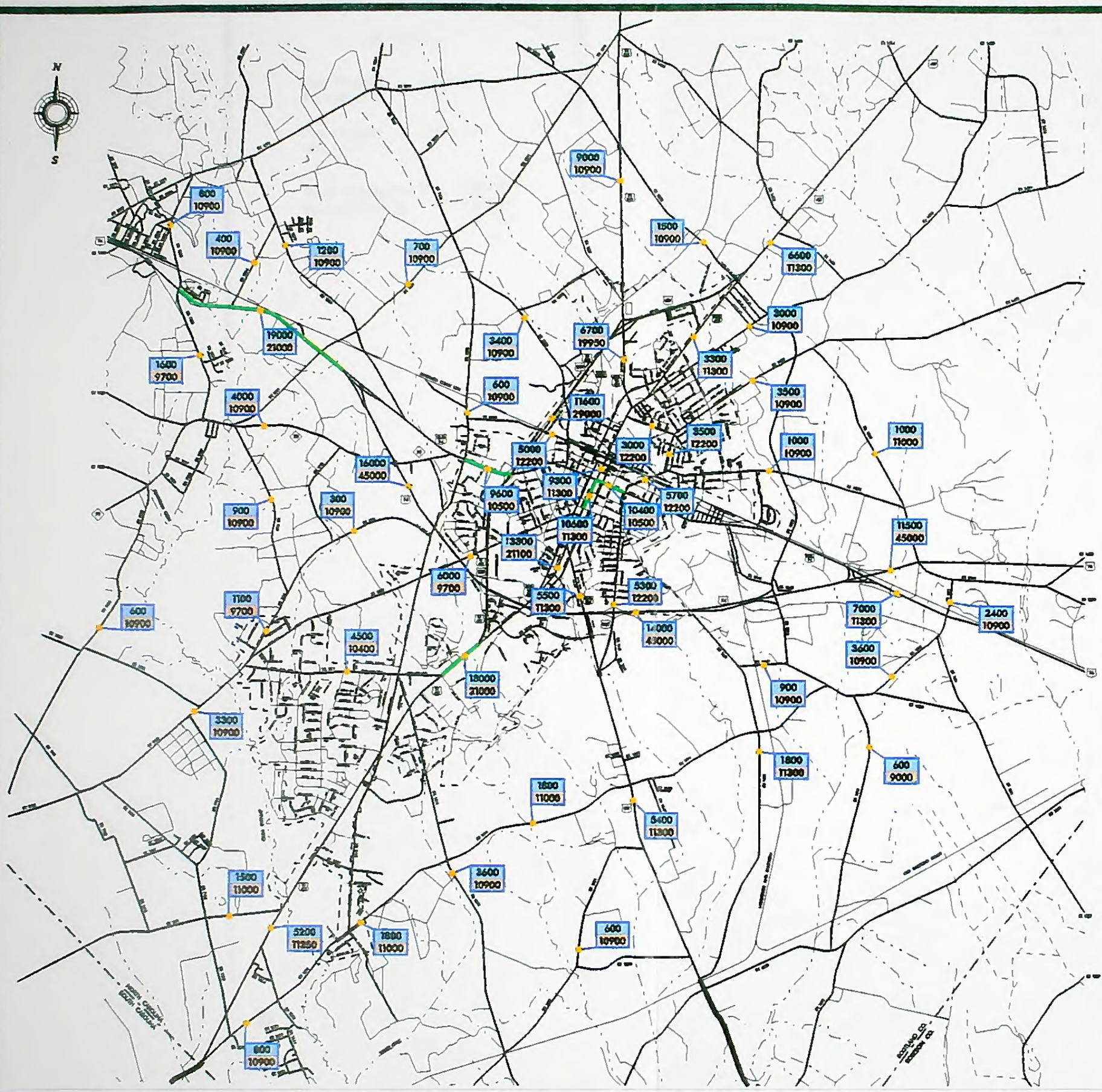
North Carolina Department of Transportation
Division of Highways–Statewide Planning Branch

in cooperation with

U.S. Department of Transportation
Federal Highway Administration

0 2000 4000 6000 8000
SCALE IN FEET

BASE: 1995



LEGEND

Near Capacity
0.8 < V/C < 1.0

Over Capacity
V/C > 1.0

1996 ADT
Capacity
00000
00000

FIGURE 6

1996 CAPACITY DEFICIENCIES

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the

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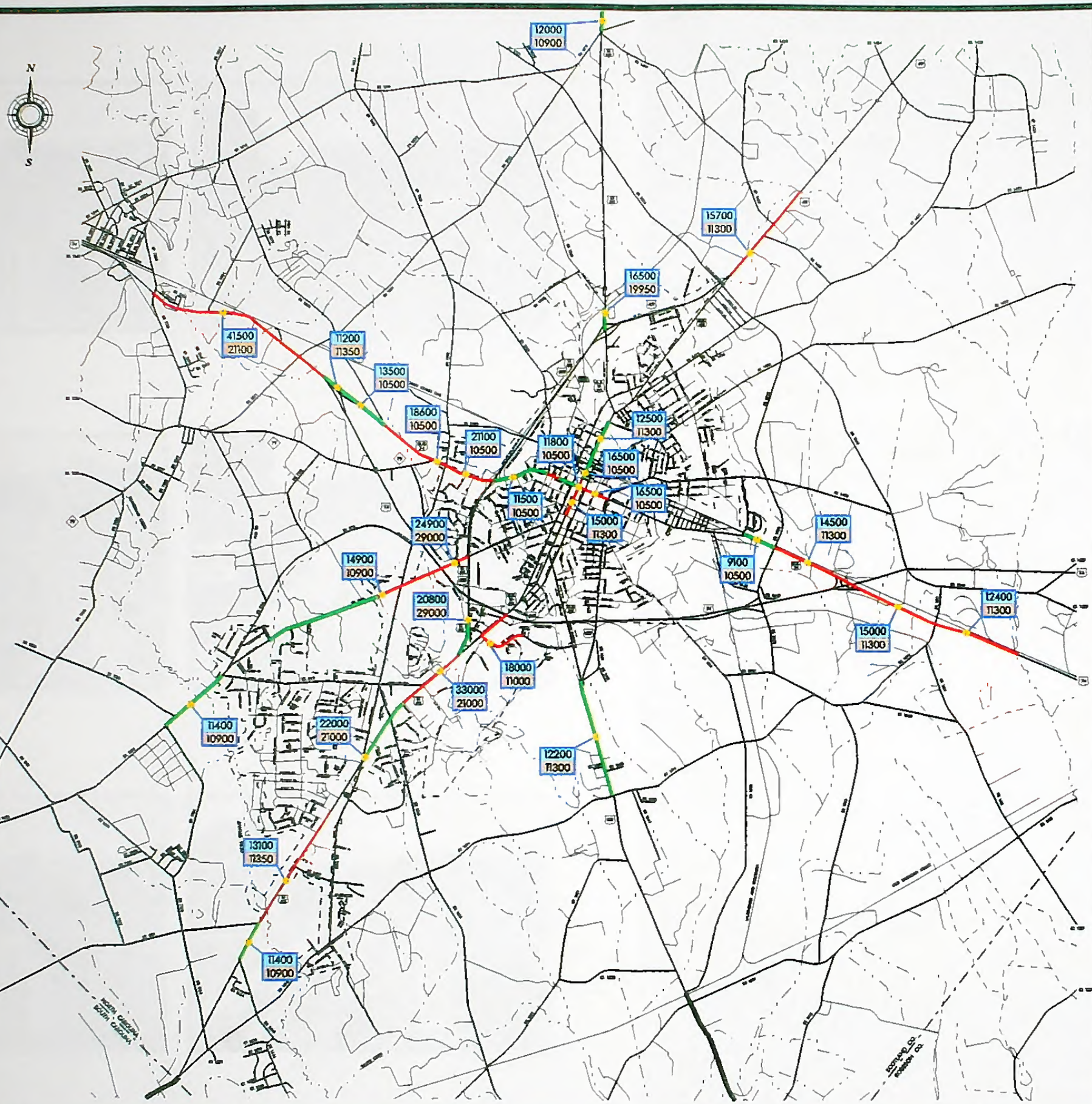
SCALE IN FEET

BASE: 1995



LEGEND

Near Capacity
0.8 < V/C < 1.0

Over Capacity
V/C > 1.0

2025 Projected Volumes
Roadway Capacity

00000
00000

FIGURE 7

2025 Anticipated Deficiencies

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the

North Carolina Department of Transportation
Division of Highways-Statewide Planning Branch

in cooperation with

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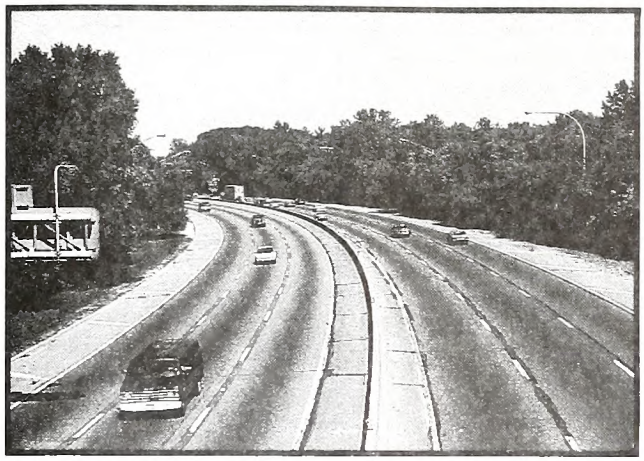
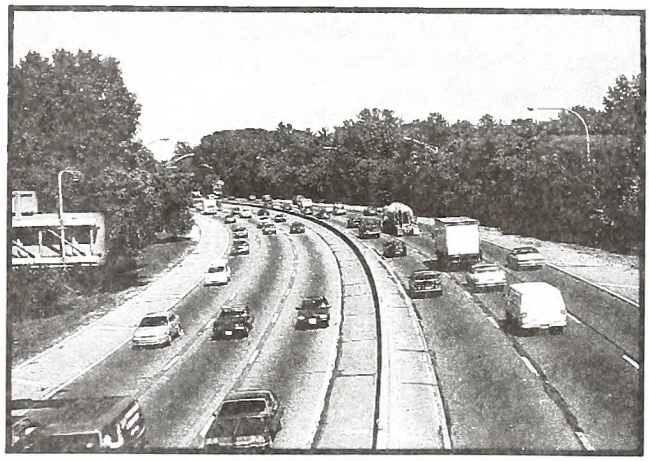
0 2000 4000 6000 8000
SCALE IN FEET

BASE: 1995

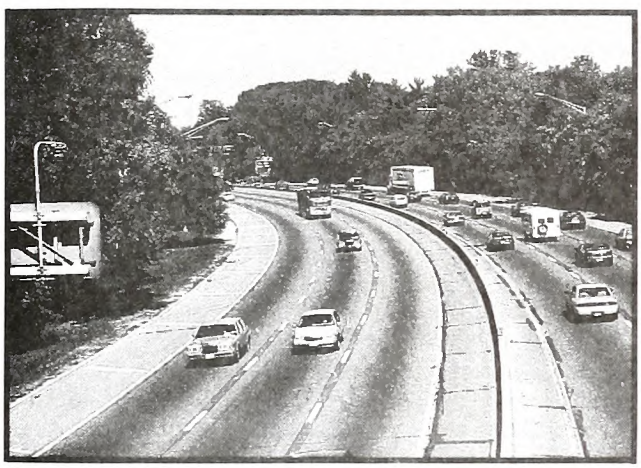
Source: 1994 Highway Capacity Manual



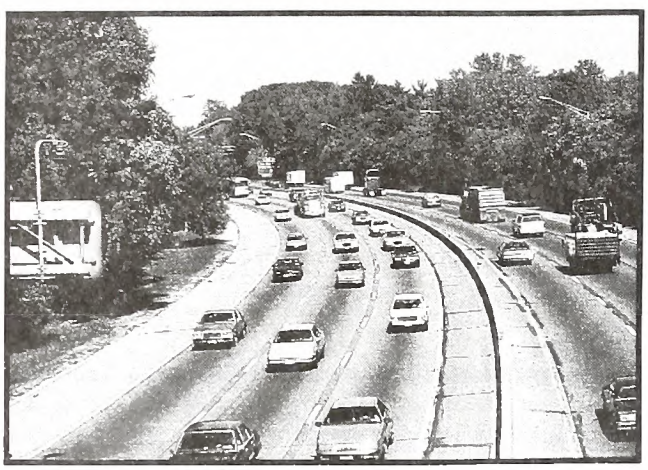
LOS A.



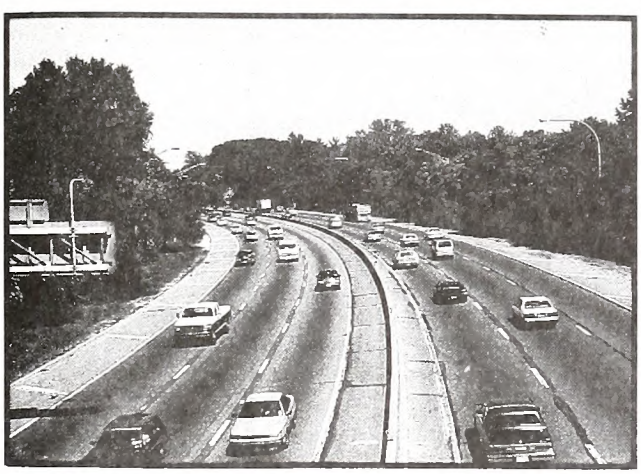
LOS D.



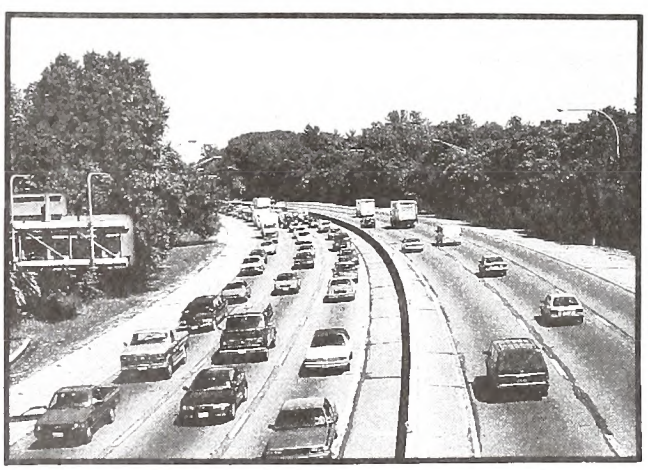
LOS B.



LOS E.



LOS C.



LOS F.

LEVELS OF SERVICE **FIGURE 8**

LEGEND

- Structurally Deficient Bridge or Functionally Obsolete Bridge

FIGURE 9

Deficient Bridges

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the

North Carolina Department of Transportation
Division of Highways-Statewide Planning Branch

in cooperation with

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Federal Highway Administration

0 2000 4000 6000 8000
SCALE IN FEET

BASE: 1995

V. Population, Land Use, And Economy

In order to fulfill the objectives of an adequate twenty-five year thoroughfare plan, reliable forecasts of future travel patterns must be achieved. Such forecasts depend on careful analysis of the following items: historic and potential population changes; significant economic trends; character and intensity of land development; and the ability of the existing transportation system to meet existing and future travel demand. Secondary items that influence forecasts include the effects of legal controls such as zoning ordinances and subdivision regulations, availability of public utilities and transportation facilities, and topographic and other physical features of the urban area.

Population

Since the volume of traffic on a roadway is related to the size and distribution of the population that it serves, population data is used to aid the development of the thoroughfare plan. A survey of housing and employment information was conducted in order to determine the 1996 socio-economic data required for traffic analysis of the planning area. Using past population trends as a control factor, the planning area population was determined by applying an occupancy factor to the actual number of counted dwelling units. **Figure 10** presents a graph of occupancy rates for both Scotland County and the City of Laurinburg since 1970. The base year occupancy rate of 3.0 persons per dwelling unit and 6,788 dwelling units established from the survey resulted in a base year planning area population of 20,364 persons.

The future year projections were determined for the 2025 design. The population was projected based upon a 1.2% growth rate that follows past growth trends, yielding a planning area population of 29,000 persons in 2025. This was then converted to actual dwelling units using occupancy rates projected from the 3.0 persons per dwelling unit established for the base year. The occupancy rate was determined to be 2.52 persons per dwelling unit for the 2025 design year, resulting in 11,508 dwelling units in the design year. A summary of dwelling units is included in **Appendix A**.

Land Use

Land use refers to the physical patterns of activities and functions within an area. The generation and attraction of a particular road is related to the land uses adjacent to that facility. The type and intensity of land use effects the traffic on the road, as well. For example, a shopping center generates larger traffic volumes than a residential area. The spatial distribution of varying land uses is the predominant determinant of when, where, and why congestion occurs. The attraction between different land uses and their association with travel varies with the size, type, intensity, and spatial separation of each land use. When dealing with transportation planning, land use is divided into the following classifications:

Residential
All land is devoted to the housing of people, with the exception of hotels and motels.

Commercial
All land is devoted to retail trade including consumer and business services and their offices; this may be further stratified into retail and special retail classifications. Special retail would include high-traffic establishments, such as fast-food restaurants and service stations; all other commercial establishments would be considered retail.

Industrial
All land is devoted to the manufacturing, storage, warehousing, and transportation of products.

Public
All land is devoted to social, religious, educational, cultural, and political activities; this would include the office and service employment classifications.

The Laurinburg/East Laurinburg planning area consists of all four types of land use. The area outside the current city and town limits is mostly residential, with some industrial and commercial development. Within municipal limits, all types of land uses prevail. Commercial development is predominant in downtown Laurinburg, as well as along US 15-401 Business. The majority of the remaining land use within the town limits is residential and industrial.

The anticipated land use development for the planning area is predominantly residential, industrial, and commercial. Noticeable residential growth is expected throughout the planning area, with the exception of the already highly-developed area within the city limits. The highest concentration of residential growth is expected in the southwest portion of the planning area. The areas of highest employment growth are expected along the major roadway corridors throughout the planning area (*US 15-501, US 401, US 74 Bypass, US 501, US 15-401).* These areas of high housing and employment growth are further illustrated in **Figure 11.**

Economic Trends
Travel patterns in an area reflect the economic environment. Employment was used as an indicator of economic activity for the Laurinburg/East Laurinburg planning area. **Table 8** presents employment data for the 1996 base year and the projected employment for the 2025 future year. A summary of employment by zone is included in **Appendix A.**

Table 8. Employment for the Laurinburg/East Laurinburg Planning Area		
Classification	**1996**	**2025**
Total Employment	12,008	17,182
Industry	6,853	9,918
Retail	1,106	1,553
Special Retail	440	696
Office	136	174
Services	3,473	4,841

Vehicle Registration

On the average, growth in vehicle registration tends to mirror growth in traffic volumes. As the number of vehicles increases, a greater strain is placed on the existing road network. Additional traffic volumes will result in additional safety hazards and congestion. To alleviate traffic congestion, steps must be taken towards constructing new roads and enhancing existing facilities.

Overall, vehicle registrations increase at a greater rate than population. This increase is best understood with the analysis of the persons per vehicle ratio over time. This ratio, which is obtained by dividing the total county population by the total vehicles registered in the county, is summarized in **Table 9**. These results illustrate the transition from a non-automobile oriented society to a heavily auto-dependent society over time. The results are also indicative of increasing income. This means that more vehicle trips are being produced, and, as a result, traffic and congestion on the street system are growing at a faster rate than population.

Table 9. Persons per Vehicle for Scotland County			
Year	**Registered Vehicles**	**Population**	**Persons/ Vehicle**
1970	10,853	26,929	2.48
1980	17,470	32,273	1.85
1990	21,116	33,763	1.60
2000	23,982	35,493	1.48
2010	26,318	36,582	1.39
2015	26,792	36,973	1.38
2020	28,323	37,387	1.32
2025	30,154	39,200	1.30

Dwelling Unit Occupancy Rates

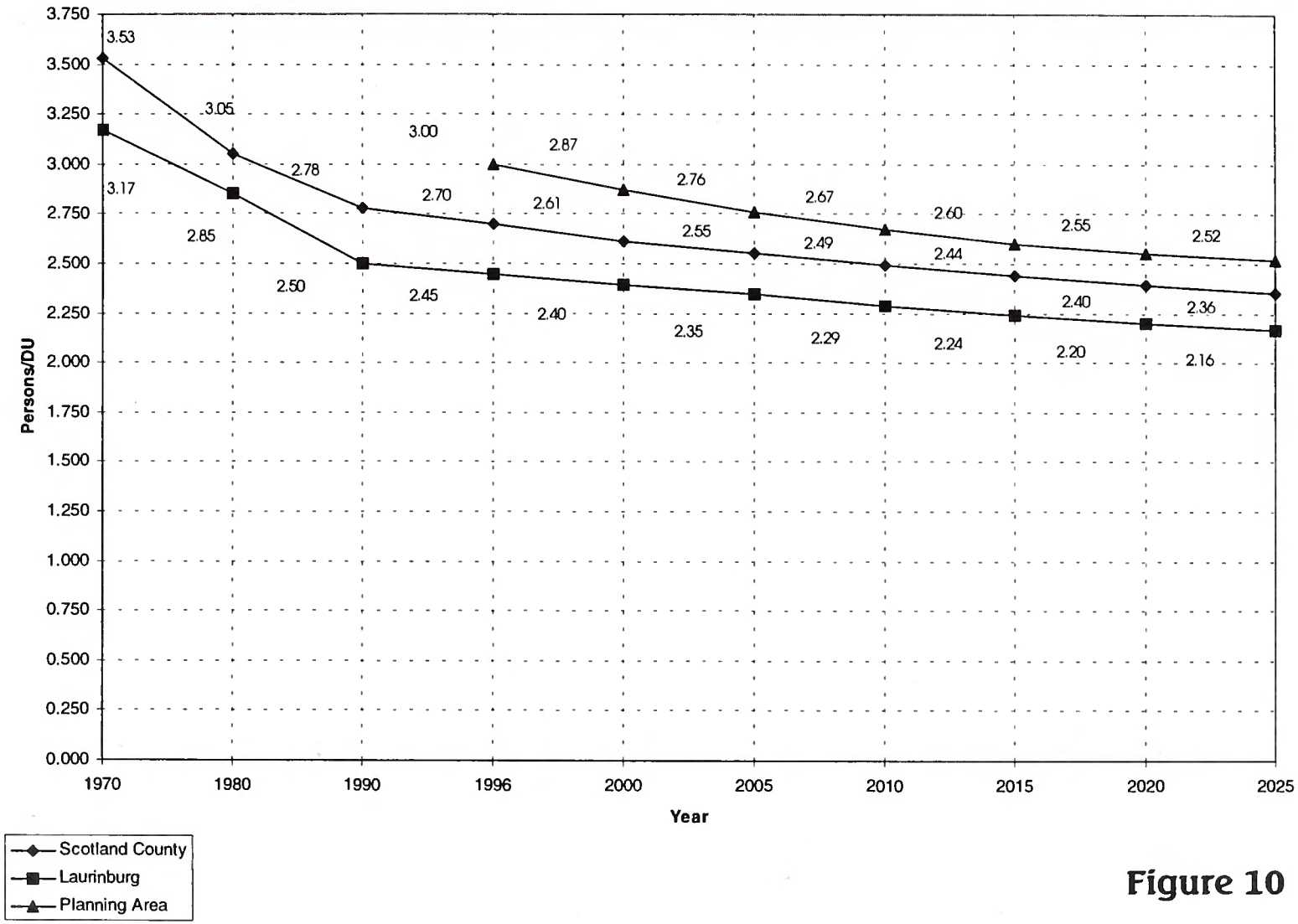
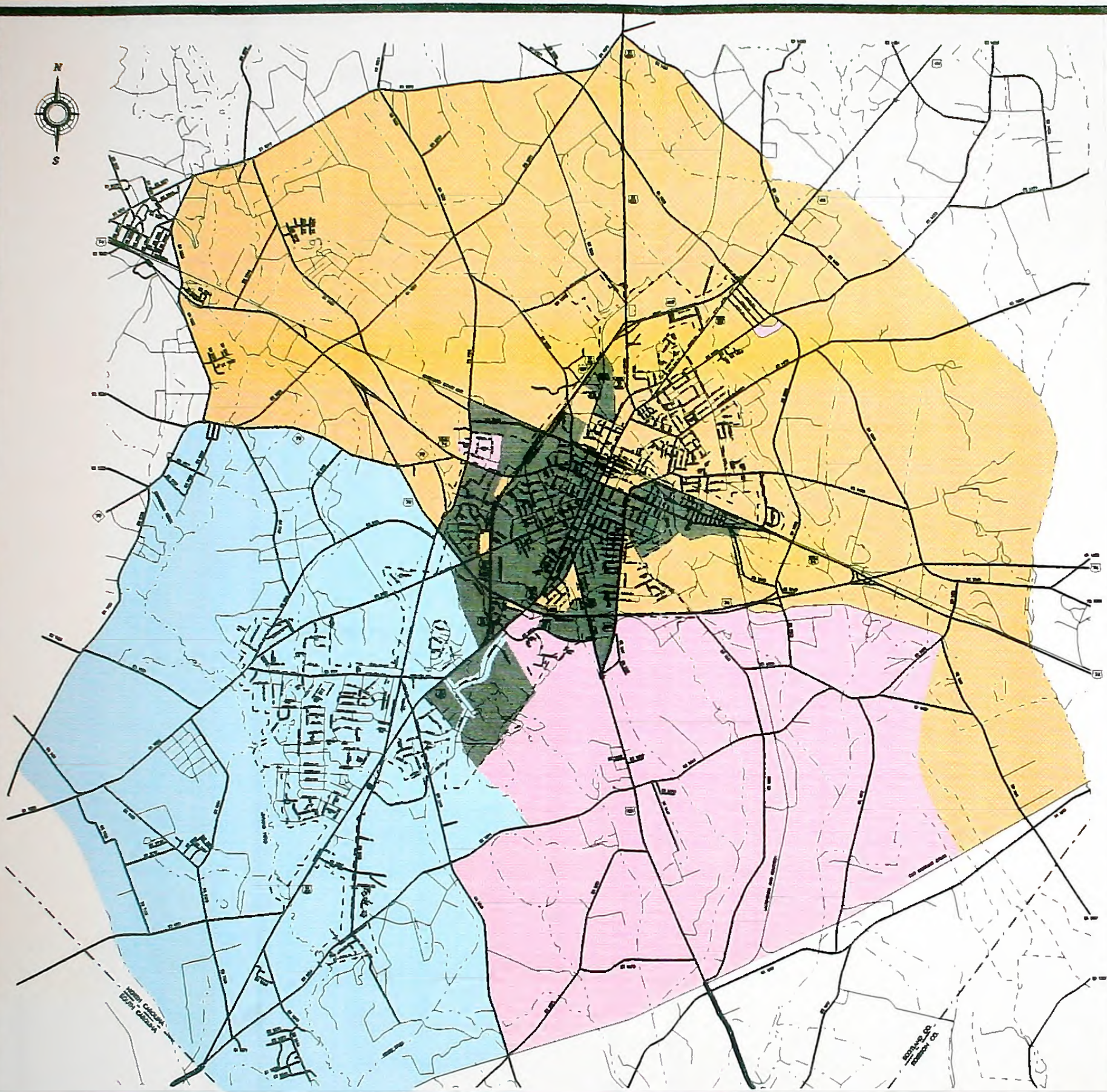


Figure 10



HOUSING PROJECTIONS

- High Growth
- Medium Growth
- Low Growth
- No Growth

FIGURE 11A

HOUSING PROJECTIONS

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the
North Carolina Department of Transportation
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in cooperation with
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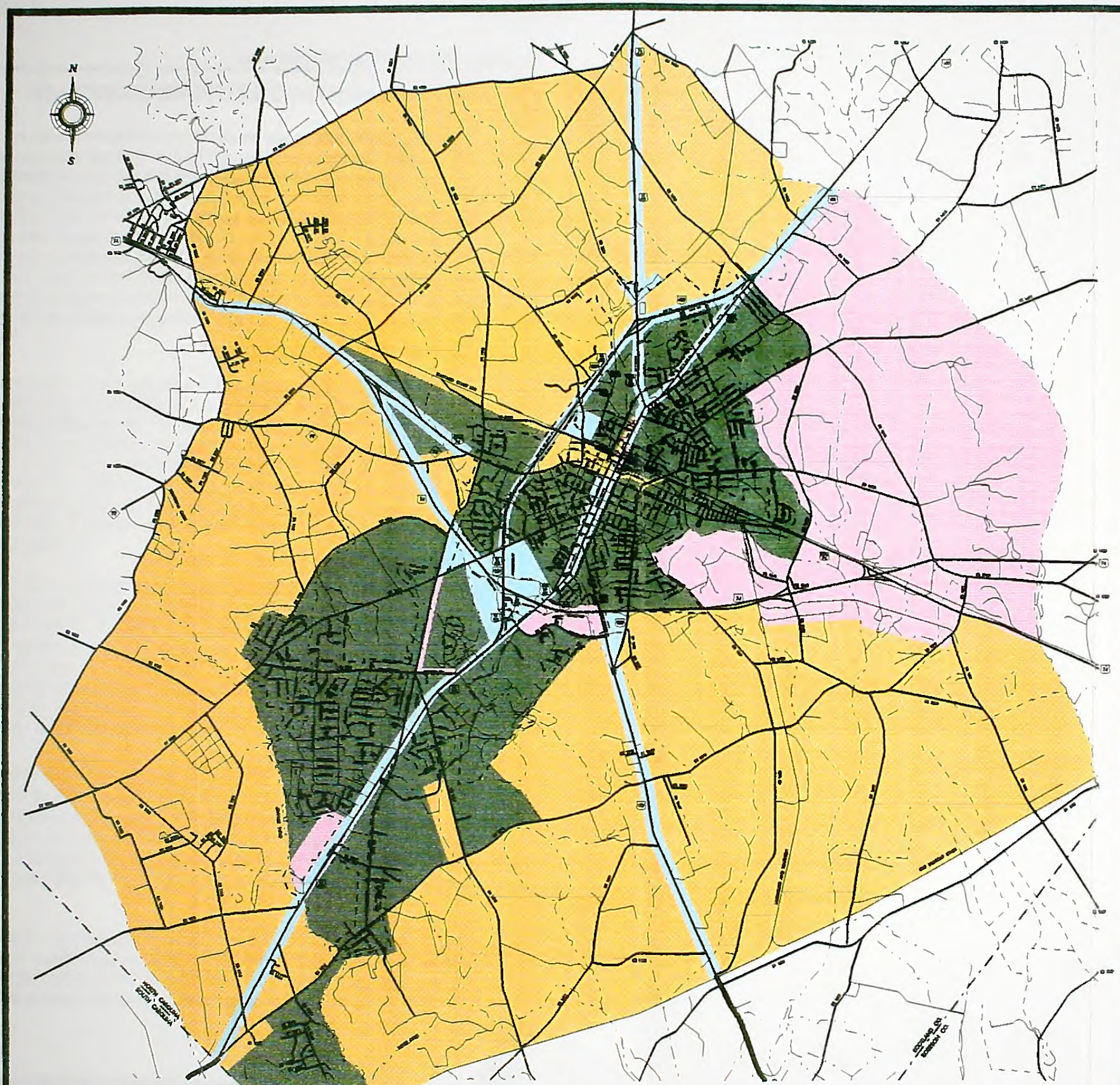
Federal Highway Administration

0 2000 4000 6000 8000
SCALE IN FEET

BASE: 1995



EMPLOYMENT PROJECTIONS

- High Growth
- Medium Growth
- Low Growth
- No Growth

FIGURE 11B

EMPLOYMENT PROJECTIONS

LAURINBURG
EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the
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0 2000 4000 6000 8000
SCALE IN FEET

BASE: 1995

VI. ENVIRONMENTAL CONCERNS

In recent years, the environmental considerations associated with highway construction have come to the forefront of the planning process. Section 102 of the National Environmental Policy Act (NEPA) requires the completion of an Environmental Impact Statement (EIS) for projects that have a significant impact on the environment. The EIS includes impacts on wetlands, wildlife, water quality, historic properties and public lands. While this report does not cover the environmental concerns in as much detail as an EIS would, consideration for many of these factors was incorporated in the development of the Thoroughfare Plan. These factors were also incorporated into the benefits-costs analyses presented in **Chapter II** for the recommended improvements.

Wetlands

Wetlands are those lands where saturation with water is the dominant factor in determining the nature of soil development and the types of plant and animal communities inhabiting the soil. Wetlands are crucial ecosystems in our environment; they help to regulate and maintain the hydrology of rivers, lakes, and streams by storing and slowly releasing flood waters. Wetlands help maintain the quality of water by storing nutrients, reducing sediment loads, and reducing erosion. Wetlands are also critical to fish and wildlife populations, providing an important habitat for approximately one-third of the plant and animal species that are listed as threatened or endangered.

The impacts to wetland areas within the Laurinburg/East Laurinburg planning area were determined with the use of the National Wetlands Inventory Mapping provided by the U. S. Fish and Wildlife Service. The location of wetlands within the planning area is shown in **Figure 12.** Minimal impacts to wetlands and other water resources are expected to result from recommended improvements. However, this mapping is merely a best estimate of the approximate location of wetlands, based upon aerial photography rather than field data. Therefore, more extensive investigations will be required prior to the design of any recommended facilities.

Threatened and Endangered Species

The Threatened And Endangered Species Act of 1973 allows the U. S. Fish and Wildlife Service to impose measures on the Department of Transportation to mitigate the environmental impacts of a roadway project on endangered animal and plant species, as well as critical wildlife habitats. Locating any rare species that exist within the planning area during this early planning stage will help to avoid or minimize impacts.

A preliminary review of the Federally Listed Threatened and Endangered Species in the Laurinburg/East Laurinburg area was completed to determine what effects, if any, the recommended improvements may have on wildlife. Mapping from the N. C. Department of Environment and Natural Resources revealed occurrences of

threatened or endangered plant and/or animal species, which are summarized in **Table 10.**

Table 10. Threatened or Endangered Species within the Planning Area

Species	Common Name	Status*	
		NC	*Federal*
Ictinia mississippiensis	Mississippi Kite	SR	
Etheostoma mariae	Pinewoods Darter	SC	
Heterodon simus	Southern Hognose Snake	SR	SC
Schoenopletus etuberculatus	Canby's Bulrush	SR	
Micurus fulvius	Eastern Coral Snake	SR	
Solidago verna	Spring Flowering Goldenrod	E	SC
Astragalus michauxii	Sands Milkvetch	C/PT	SC
Picoides borealis	Red Cockaded Woodpecker	E	
Solidago tortiphila	Twisted-Leaf Goldenrod	SR	

* See **Appendix G** for definitions of status.

Historic Sites

Section 106 of the National Historic Preservation Act requires the Department of Transportation to identify historic properties listed in, as well as eligible for, the National Register of Historic Places (NRHP). The DOT must consider the impacts of road projects on these properties and consult with the Federal Advisory Council on Historic Preservation.

N. C. General Statute 121-12(a) requires the NCDOT to identify historic properties listed on the National Register, but not necessarily those eligible to be listed. The NCDOT must consider the impacts and consult with the N. C. Historical Commission, but is not bound by their recommendations.

The location of historic sites within the Laurinburg/East Laurinburg area was investigated to determine any possible impacts resulting from the recommended improvements. This investigation identified only one property listed on the NRHP, the Thomas J. Gill House. This historic building is located along Everett Street and is not anticipated to be impacted by any of the recommended improvements.

Archaeological Impacts

The location of recorded archaeological sites was researched to determine the possible impacts of proposed roadway projects. Based upon this initial investigation, no archaeological sites should be impacted by the recommended improvements. However, archaeological sites are often difficult to identify without actual field excavation. As a result, possible sites may not be identified during the initial

planning process; therefore, each proposed project should be evaluated individually prior to construction.

Housing and Neighborhoods

The preservation of cohesive neighborhoods is a fundamental aspect of thoroughfare planning. When specific streets are designated as thoroughfares, heavy traffic is minimized on neighborhood streets, thereby minimizing negative impacts. In order to reduce heavy traffic on residential streets, it is imperative that new facilities be constructed and deficient facilities be improved.

Educational Facilities

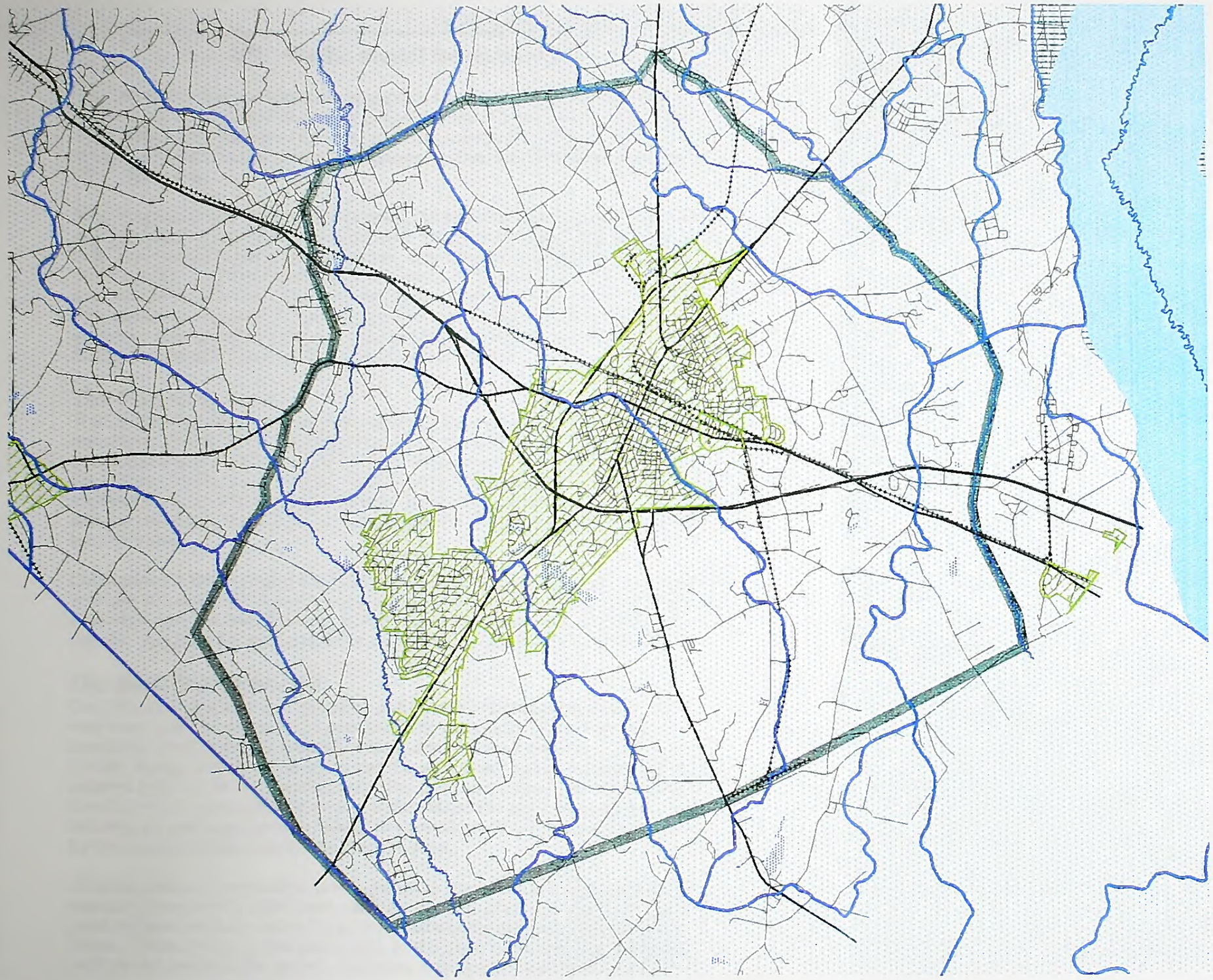
The location of educational facilities in the Laurinburg/East Laurinburg planning area was considered during the development of the thoroughfare plan. No school or other educational facility shall be displaced by any proposed facilities or improvements. In fact, the implementation of the Thoroughfare Plan will result in positive effects on educational facilities in the Laurinburg area. The proposed widening of Church Street (US 74 Business) will improve access and safety for Scotland County High School and will help to minimize the impact of school traffic on the surrounding roadway facilities.

Economic Environment

The development and implementation of the Laurinburg/East Laurinburg Thoroughfare Plan will have a positive effect on the economic development of the planning area. As new thoroughfares are constructed and existing ones are widened, travel conditions will improve, resulting in a positive impact on the overall business climate. The construction of new facilities will make more land available for new business developments, which will increase employment opportunities.

Laurinburg/ East Laurinburg Planning Area

Wetlands and Water Resources



- Major Water Bodies
- Major River Basins
- Minor River Basins
- Major Rivers & Streams
- Hydrologic Units
- HQW/Outstanding Resource Water Zones

Water Supply Watersheds

- Critical
- Protected
- National Wetland Inventory
- Municipal Boundaries
- Railroads

Roadways

- Interstate
- US
- NC
- SR
- City
- Planning Area Boundary

N

W E

S

10000 0 10000 Feet

Figure 12

VII. Traffic Model Development

The development of the 1998 Laurinburg/East Laurinburg Thoroughfare Plan required the development of a model to replicate travel in the planning area. This model applied the traditional four-step planning process *(trip generation, trip distribution, mode choice, and trip assignment)* to both the 1996 base year and the 2025 design year.

Prior to application of the four-step process, the planning area was delineated and the 1996 base year network was developed. Next, socioeconomic data and traffic data were applied to the four-step process, simulating the 1996 traffic patterns of the planning area. Once the traffic model accurately reflected the traffic counts, the socioeconomic data was projected to the 2025 design year and the four-step process was repeated. The existing street system was then loaded with the projected traffic volumes. This loaded network was analyzed for deficiencies, and alternate solutions for these anticipated capacity deficiencies were evaluated.

The Planning Area

The Laurinburg/East Laurinburg planning area encompasses the current city and town limits, as well as the outlying portion of Scotland County where the City anticipates urban development by the 2025 design year. Shoe Heel Creek defines the eastern planning area boundary and an abandoned railroad grade serves as the southern planning area boundary. Current and anticipated land use and discussions with the Laurinburg Planning Department led to the determination of the remaining boundary lines.

Data collection efforts required the division of the planning area based upon common land use into eighty-five travel analysis zones. The smaller zones in the downtown area represent high density areas, while the larger zones represent areas of lower density. The planning area and traffic analysis zones are shown in **Figure 13.**

The Base Year Network

Once the planning area was delineated and divided into zones, the base network was developed. Since the purpose of the traffic model was to duplicate the prevailing conditions of the existing street system, the base network needed to include enough streets on the actual street system to accurately represent the traffic patterns found within the planning area. The base year network chosen includes all streets carrying substantial volumes of traffic. Major and minor thoroughfares were included, as well as some local streets. **Figure 14** presents the base year network for the Laurinburg/East Laurinburg Planning Area.

Characteristics of the modeled streets, including speed, distance, and capacity, are important components of the base year network. The speed and distance along each modeled roadway define the minimum time paths between traffic analysis zones. These minimum time paths serve as the basis in the model for assigning traffic to the streets in the system. Generally in the Laurinburg/East Laurinburg

model, the speeds assigned to the streets were at or slightly below the posted speed limit, representing, as closely as possible, the actual speed of traffic traveling on the facility.

Trip Generation

The model predicts travel for three different types of trips within the planning area: through trips, internal trips, and external ←→ internal trips. *Through trips* are those trips produced outside the planning area which pass through in route to a destination located outside the planning area. *Internal trips* are those trips having both their origin and destination inside the planning area. Internal trips can be further stratified by trip purpose: home based work, home base other, and non-home based. *External ←→ internal* trips are those having one trip end within and one trip end outside of the planning area.

Trip generation, the first step of the traditional four-step travel demand forecasting process, estimates how many trips are produced by, and attracted to, a traffic analysis zone. The NCDOT uses an in-house program (IDS) to perform trip generation. *Trip productions* within each zone were determined by applying generation rates to the total dwelling units, commercial autos, and taxis in each zone. In order to account for varying trip generation rates, the dwelling units were stratified into the following groupings: excellent, above average, average, below average, and poor. This stratification uses housing conditions as a surrogate for trip making. Each classification of housing was assigned a coefficient representing the total trips made per household. The generation rates for dwelling units, commercial autos, and taxis are presented in **Table 11**.

Trip attractions were determined using a set of regression equations. These equations relate the trips that are attracted to each zone to the employment that exists in the zone. The equations used for the model are as follows:

HBW $Y = 1.0X_1 + 1.0X_2 + 1.0X_3 + 1.0X_4 + 1.0X_5 + 1.0X_9 + 1.0X_{10}$

HBO $Y = 0.2X_1 + 2.7X_2 + 8.36X_3 + 3.0X_4 + 3.42X_5 + 2.25X_9 + 8.0X_{10} + 0.5X_{12}$

NHB $Y = 0.2X_1 + 2.7X_2 + 8.36X_3 + 3.0X_4 + 3.42X_5 + 2.25X_9 + 8.0X_{10} + 0.5X_{12}$

EXT-INT $Y = 0.6X_1 + 2.7X_2 + 8.36X_3 + 3.0X_4 + 3.42X_5 + 2.25X_9 + 8.0X_{10} + 0.5X_{12}$

where
- Y = Attraction factor
- X_1 = Industry (SIC 1-49)
- X_2 = Retail (SIC 50-54, 56,57,59)
- X_3 = Special Retail (SIC 55, 58)
- X_4 = Office (SIC 60-67, 91-97)
- X_5 = Services (SIC 70-76, 78-79,99)
- X_9 = Special attraction factor
- X_{10} = Special attraction factor
- X_{12} = Attraction caused by total housing per zone

The special attraction factor in category X_9 was created to attract trips to Zone 42, where the major employment center generates large volumes of traffic. Another special attraction factor was developed in category X_{10} to attract trips that are generated by various schools throughout the planning area. Attraction factors for each trip purpose were adjusted so that total attractions would equal total productions.

Internal Trip Analysis

Internal zone-to-zone trips were broken into three categories: home based work (HBW), home based other (HBO), and non-home based (NHB). A trip breakdown by type is presented in **Table 11**. In addition to these types of trips, the model also accounts for secondary trips made within the planning area by vehicles garaged outside the planning area. These secondary non-home based trips (NHB_2) were calculated using the following formula:

$$NHB_2 = [\text{(Total E} \leftrightarrow \text{I Trips)} - \text{(Int} \rightarrow \text{Ext Trips)}] \times F$$

where Total E ←→ I Trips = Total External to Internal Trips
Int → Ext Trips = Total Trips - %Internal of Total Trips
F = Factor based on number of in-commuters making secondary trips

1996 NHB_2 = (60,358 - 12,341) x 0.6 = 28,810

2025 NHB_2 = (138,947 - 24,774) x 0.6 = 68,504

Through Trip Analysis

The through trip table for this study was developed using the SYNTH computer program developed by J. T. McDonnell, P.E., which is based upon *Technical Report Number 3, Synthesized Through Trip Table for Small Urban Areas*, by David G. Modlin, Jr., Ph.D., P.E. This method of deriving through trips is based upon the fratar balancing method, which balances the trip interchanges at the external stations. **Table 14** presents a summary of travel at the external stations.

Table 11. Travel Model Input Variables				
Generation Rates for Housing	**1995 Base Year**		**2025 Design Year**	
Excellent	12.0		13.47	
Above Average	10.0		11.47	
Average	8.7		10.17	
Below Average	6.6		8.07	
Poor	4.0		5.47	
Commercial Auto	40.0		41.47	
Taxi	6.70		8.17	
Trips by Purpose	**1995 Base Year**		**2025 Design Year**	
Internal of Total	50,803	*90%*	103,055	*90%*
Home Based Work	11,685	*23%*	23,703	*23%*
Home Based Other	24,893	*49%*	50,497	*49%*
Non-Home Based	14,225	*28%*	28,855	*28%*
Persons / Household	3.00		2.52	
Average Daily Trips / Household	8.32		9.95	
Employment-to-Population Ratio	0.59		0.65	

Trip Distribution

Trip distribution is the next phase in the travel demand forecasting process. Trip distribution uses the productions and attractions output by trip generation to create trip origins and destinations for each zone. The gravity model was used to distribute trips across the network based upon the relative attractiveness of the destination zone and the distance from the productions. The gravity model is based on the concept that the trips from one zone to another zone is proportional to the trip attractions and productions at each zone and inversely proportional to the impedance (or travel time) between the zones.

The gravity model is expressed by the following equation:

$$T_{ij} = P_i \times \frac{A_j \times F_{ij} \times K_{ij}}{\sum_{j=1}^{n} (A_j \times F_{ij} \times K_{ij})}$$

Where:
- T_{ij} = Number of trips produced in zone i and attracted to zone j
- P_i = Number of trips produced in zone i
- A_j = Number of trips attracted in zone j
- F_{ij} = Friction factor from zone i to zone j
- K_{ij} = Socio-economic adjustment factor
- n = Total number of zones
- I = Origin zone number
- j = Destination zone number

The friction factor, or travel time factor, is critical to the gravity model distribution. The distance between traffic zones and the time required to travel those distances affects the friction factor. It is also related to the specific trip purpose (HBW, HBO, NHB, NHB2, and E←→I). The friction factors for the Laurinburg/East Laurinburg model were derived from those developed for a similar study. These factors, which are summarized in **Table 12**, were adjusted to reflect travel times for the study area for each trip purpose and input into the gravity model.

Table 12. Friction Factors

Time Interval	Friction Factors (Trips Distributed)				Time Interval	Friction Factors (Trips Distributed)			
	HBW	HBO	NHB	E → I		HBW	HBO	NHB	E → I
1	500	500	450	700	11	52	41	23	116
2	1000	1000	900	1400	12	39	31	17	91
3	2271	2119	1782	2895	13	30	24	13	72
4	971	870	661	1426	14	24	18	10	58
5	516	449	318	838	15	19	14	7	47
6	309	263	176	542	16	0	0	6	38
7	199	167	107	373	17	0	0	5	30
8	136	112	69	268	18	0	0	0	24
9	96	78	46	199	19	0	0	0	0
10	80	56	32	151	20	0	0	0	0

Trip Assignment

The last phase of the travel demand forecasting process is trip assignment. Trip assignment determines the route used to complete a trip and loads all trips onto the network. The all-or-nothing method is the simplest form of loading and was used to load the network. For each zone-to-zone pair, this method assigns all trips to the route with the shortest time. No trips are assigned to the other competing routes.

The existing Laurinburg roadway network encompasses two bypass routes, US 74 Bypass and US 15-401-501 Bypass. Observation of travel patterns in the area show that not all through traffic follows these Bypass routes when traversing the planning area. In order to account for those through trips that utilize the secondary or Business routes, trip assignment was accomplished by loading the trips in two distinct iterations. First, the through trips were loaded exclusive of the internal travel trips. The through trips were loaded on the base year network for which roadway speeds were modified to allow for through traffic to travel both the Business and Bypass routes. Next, the internal trips were loaded independent of the through trips onto the unmodified base year network. The two resulting networks were then merged, yielding a network loaded with all trips.

Calibration and Model Validation

The planning area was divided into quadrants using an east-west screenline and a north-south screenline. The first screenline runs from the southern planning area boundary to US 15-401, travels through downtown Laurinburg, then crosses the northern planning area boundary following the Laurinburg and Southern railway. The second screenline begins at the western planning area boundary following the Seaboard Coastline railway to the eastern planning area boundary. These screenlines are imaginary lines running through the planning area that were used to check the volume of travel dispersing throughout the traffic model.

The screenlines, as illustrated in **Figure 13**, were chosen in conjunction with the determination of the planning area. Traffic counts were taken at each location where a roadway crossed the screenline or cordon line. In addition, additional counts were taken at locations throughout the planning area to help determine travel patterns and validate the model.

Once the model distributed trips across the network using an all-or-nothing loading assignment, the assigned volumes were compared to actual ground counts across the two screenlines. The model is considered to be calibrated when the computer generated screenline totals are within 10% of the actual ground counts. The screenline comparisons are summarized in **Table 13**.

Table 13. Model Validation

Screenline	Actual Count	Model Volume	Difference
East - West	40,270	40,764	1%
North - South	25,222	22,996	9%

Data Projections

Once the calibration of the base year model was complete, anticipated design year traffic conditions were simulated by projecting the internal, external, and through trips to the 2025 design year. The future internal trips were estimated by projecting the housing and employment data to the design year and then allocating these projections to individual traffic analysis zones. The projections were developed based upon historical trends for Scotland County, Laurinburg and East Laurinburg, and coordination with the local government. The allocation of these projections was coordinated with the City of Laurinburg Planning Department, and was based upon the existing and anticipated development throughout the planning area. Future external and through trips for the 2025 design year were projected from the base year traffic using a linear projection of past growth rates and knowledge of the area's development patterns.

For the design year analysis, an increase in the generation rates was determined as follows:

Generation Rate Increase = (Avg 1996 Trip Rate X Composite Factor) - Avg 1996 Trip Rate

where Composite Factor = $\frac{\text{1996 Vehicle Ownership}}{\text{2025 Vehicle Ownership}}$ x Usage Factor x $\frac{\text{2025 Persons/DU}}{\text{1996 Persons/DU}}$

Average 1996 Trip Rate	=	8.32 trips/day
1996 Vehicle Ownership	=	1.50 vehicles/person
1996 Persons/DU	=	3.00 persons/DU
2025 Vehicle Ownership	=	1.21 vehicles/persons
2025 Persons/SU	=	2.52 persons/DU
Usage Factor	=	0.99

Composite Factor = $\frac{1.50}{1.06}$ x 0.99 x $\frac{2.52}{3.00}$

= 1.177

∴ Generation Rate Increase = (8.32 X 1.177) - 8.32 = 1.47

External and through trip projections for the 2025 design year were projected from the base year traffic using a linear projection of past growth rates along with knowledge of the area's development patterns. **Table 14** presents the external ←→ internal and through trip-ends determined, along with the corresponding traffic count at each station.

Table 14. Cordon Station Travel

STATION		1996 BASE YEAR				2025 DESIGN YEAR			
Number	Location	Total ADT	% Through Trips	Through Trip Ends	Ext ←→ Int Trips	Total ADT	% Through Trips	Through Trip Ends	Ext ←→ Int Trips
101	US 15-501	5007	20.0	1000	4007	12000	49.8	5980	6020
102	US 401	6640	20.0	1328	5312	15500	19.9	3079	12421
103	SR 1425	1860	8.0	150	1710	3400	7.9	268	3132
104	SR 1433	1462	7.0	104	1358	2900	7.0	202	1698
105	US 74 Byp	11481	20.0	2300	9181	31000	20.2	6249	24751
106	SR 1369	2278	17.0	392	1886	4000	17.1	683	3317
107	US 74 Bus	54261	20.0	1060	4201	12400	20.2	2509	9891
108	SR 1611	736	10.0	66	670	1350	9.3	125	1225
109	SR 1613	623	13.0	74	549	1000	11.9	119	881
110	US 501	3871	20.0	778	3093	9100	20.0	1818	7282
111	SR 1615	2215	15.0	330	1885	3400	14.8	503	2897
112	US 15-401	5200	20.0	1048	4152	12300	20.0	2456	9488
113	SR 1001	1523	15.0	228	1295	2300	15.2	350	1950
114	SR 1108	2900	11.0	316	2584	5100	11.0	559	4541
115	SR 1128	424	12.0	46	378	775	11.7	91	684
116	SR 1311	1590	15.0	236	1354	3500	15.0	524	2976
117	SR 1130	288	12.0	36	252	500	10.2	51	449
118	NC 79	2157	18.0	392	1765	4400	17.9	789	3611
119	SR 1126	784	13.0	98	686	1400	12.3	172	1228
120	US 74	15098	20.0	3010	12088	44000	31.6	13901	30099
121	SR 1306	258	12.0	32	226	400	12.5	50	350
122	SR 1312	362	12.0	42	320	560	11.1	62	498
123	SR 1319	3618	17.0	618	3000	6400	58.4	3737	2663
124	SR 1337	990	14.0	134	856	1800	13.4	241	1559
125	SR 1324	1829	9.0	164	1665	3200	8.7	278	2922
126	SR 1333	693	13.0	90	603	1200	11.8	142	1058
Totals		**79148**		**14072**	**65076**	**183885**		**44938**	**138947**

LEGEND

- Cordon Line
- Screen Line
- Zone Line

FIGURE 13

ZONE MAP

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the
North Carolina Department of Transportation
Division of Highways-Statewide Planning Branch
in cooperation with
U.S. Department of Transportation
Federal Highway Administration

0 2000 4000 6000 8000
SCALE IN FEET

BASE: 1995

N

S

LEGEND

Modeled Network Streets

FIGURE 14

TRANPLAN NETWORK

LAURINBURG EAST LAURINBURG

SCOTLAND COUNTY
NORTH CAROLINA

Prepared by the

North Carolina Department of Transportation
Division of Highways-Statewide Planning Branch

in cooperation with

U.S. Department of Transportation
Federal Highway Administration

0 2000 4000 6000 8000

SCALE IN FEET

BASE: 1995

VIII. THOROUGHFARE PLANNING PRINCIPLES

Objectives

Typically, the urban street system occupies 25 to 30 percent of the total developed land in an urban area. Since the system is permanent and is expensive to build and maintain, much care and foresight are required in its development. Thoroughfare planning is the process used by public officials to assure the development of the most appropriate street system to meet existing and future travel desires within the urban area.

The primary objective of a thoroughfare plan is to guide the development of the urban street system in a manner consistent with the changing traffic patterns. A thoroughfare plan will enable street improvements to be made as traffic demands increase. In addition, it will alleviate unnecessary improvements, thereby averting needless expense. By developing the urban street system to keep pace with increasing traffic demands, a maximum utilization of the system can be attained, requiring a minimum amount of land for street purposes. In addition to providing for traffic needs, the thoroughfare plan should include those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population, commercial, and industrial development affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

- providing for the orderly development of an adequate major street system as land development occurs;
- reducing travel and transportation costs;
- reducing the cost of major street improvements to the public through the coordination of the street system with private action;
- enabling private interests to plan their actions, improvements, and development with full knowledge of public intent;
- minimizing the disruption and displacement of people and businesses through long-range advance planning for major street improvements;
- reducing environmental impacts, such as air pollution that results from transportation; and
- increasing travel safety.

Thoroughfare planning objectives are achieved by both improving the operational efficiency of thoroughfares and by improving the system efficiency through system coordination and layout.

Operational Efficiency

The operational efficiency of a street is improved by increasing the street's capability to carry additional vehicular traffic and people. In terms of vehicular traffic, capacity is defined as the maximum number of vehicles which can pass a given point on a

roadway during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, and weather.

Physical methods of improving vehicular capacity include street widening, intersection improvements, improved signalization, vertical and horizontal alignment improvements, and the elimination of roadside obstacles. For example, widening a street from two to four lanes more than doubles the capacity of the street by providing additional maneuverability for traffic, thereby reducing the impedances to traffic flow caused by slow moving or turning vehicles and the adverse effects of horizontal and vertical alignments.

The vehicular capacity of a road may be improved with the implementation of several operational measures. The following are examples of operational improvements to street capacity:

Control of access - A roadway with complete control of access can often carry three times the traffic handled by a non-controlled access street with identical lane width and number. An example of this would be US 74 Bypass;

Parking removal - By removing parking along a roadway, capacity is increased since there is additional street width for traffic flow and the friction to flow caused by parking vehicles is reduced;

One-way operation - The capacity of a street can sometimes be increased by 20% to 50%, depending upon turning movements and overall street width, by initiating one-way traffic operations. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.

Reversible lanes - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.

Signal phasing and coordination - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

Intelligent Vehicle Highway System (IVHS) - This involves applying advanced concepts and technology in the area of communications, navigation, and information systems to provide solutions to traffic congestion and, at the same time, improve highway safety and reduce environmental effects. It covers passengers, freight, and public transit vehicles and fleets. The IVHS Program is structured according to five major system areas:

- ***Advanced Traffic Management System*** - Provides real-time adjustment of traffic control systems and real-time means for transportation operators to effectively monitor traffic conditions and communicate to devices, quickly adjust traffic operations, and promptly respond to incidents;

- ***Advanced Traveler Information System*** - Provides continuous advice regarding traffic conditions, alternate routes, and warnings regarding road safety;

- ***Commercial Vehicle Operations*** - Improves operations efficiency and productivity of trucks, buses, and other fleets or vehicles and improves the efficiency of necessary regulatory activities;

- ***Advanced Vehicle Control*** - Vehicle and/or roadway based electromechanical and communication devices that enhance the control of vehicles by facilitating and augmenting driver performance and ultimately relieving the driver of most tasks on designated instrumented roadways; and

- ***Advanced Public Transportation Systems*** - Providing mass transport users and operators (such as buses, vanpoolers, high-occupancy vehicle lanes, carpools, taxicabs) with up-to-date information on status, schedules, and availability of public transit systems including automatic vehicle location and monitoring systems to improve fleet management as well as electronic free media.

High-Occupancy Vehicle Lanes (HOV Lanes) - This involves designating existing traffic lanes for exclusive use by high-occupancy vehicles such as carpools, vanpools, and buses. These can be altered according to demand to increase capacity. For example, some HOV lanes can be designated HOV only during peak hours and/or HOV lanes can be reversible between the morning and afternoon peak hours to reflect the shift in directional flow of traffic.

Altering travel demand is a third method of improving the vehicular capacity of existing streets. The capacity of a road can be increased without requiring physical changes to the characteristic of the road. Travel demand can be reduced or altered in the following ways:

- Encourage people to form carpools and vanpools for journeys to work and other trip purposes. This reduces the number of vehicles on the roadway and raises the people-carrying capacity of the street system;

- Promoting the use of transit and bicycle modes;

- Encouraging industries, businesses, and institutions to stagger work hours or establish variable work hours for employees. This will spread peak travel over a longer time period, thereby reducing peak hour demand; and

- Planning and encouraging land use development or redevelopment in a more travel efficient manner.

System Efficiency

Another means for altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost to the user. Improvements in system efficiency can be achieved through the concept of functional classification of streets and development of a coordinated major street system.

Functional Classification

The two primary functions of roadways are traffic service and land service. However, when combined, these are basically incompatible. If the demand for traffic and land service are low, then this conflict is not serious. When traffic volumes are high, however, conflicts created by uncontrolled and intensely used adjacent property results in intolerable traffic flow friction and congestion.

The underlying concept of the thoroughfare plan is to provide a functional system of streets which permits travel between origins and destinations with directness, ease, and safety. Various streets within the system are designed to perform specific functions, thereby minimizing traffic and land service conflict. Streets are categorized by function as local access streets, minor thoroughfares, or major thoroughfares.

Local access streets provide access to abutting property and are not intended to carry heavy volumes of traffic. The location of these facilities should dictate that only traffic having origins and destinations on those streets are served. Local streets may be further classified as either residential, commercial, and/or industrial, depending upon which type of land use they serve.

Minor thoroughfares are facilities which collect traffic from local access streets and carry this traffic to the major thoroughfares. In some instances, minor thoroughfares may supplement the major thoroughfare system by facilitation of minor through traffic movements. In addition, minor thoroughfares provide access to abutting property. They should be designed to serve limited areas in order to prevent their development as major thoroughfares.

Major thoroughfares are the primary traffic arteries of an area. The function of a major thoroughfare is to move intra-city and inter-city traffic. Since they are intended to carry traffic, the streets which comprise the major thoroughfare system are strongly discouraged from serving abutting property. They should not be bordered by uncontrolled strip development since such development significantly lowers the capacity of the thoroughfare to carry traffic and each driveway is a danger and an impediment to traffic flow. Major thoroughfares may range from a two-lane street carrying minor traffic volumes to a major expressway with four or more travel lanes. Parking should normally not be permitted on major thoroughfares.

Idealized Major Thoroughfare System

A coordinated system of major thoroughfares forms the basic framework of the urban street system. A major thoroughfare system which is most adaptable to desire lines of travel within an urban area is the radial-loop system. This system permits movement between various areas of the city with maximum directness. The functional elements of this system, shown in **Figure 15**, include radial streets, crosstown streets, loop system streets, and bypasses.

Radial streets service traffic movement between points located on the outskirts of the city and the central area. This is a major traffic movement in most cities, and the economic strength of the central business district (CBD) depends upon the adequacy of this type of thoroughfare.

If all radial streets crossed in the central area, an intolerable congestion problem would result. To avoid this, a system of crosstown streets forming a loop around the CBD is necessary. This system allows traffic to move from origins located on one side of the central area to destinations on the other side , following the border of the area. In addition, central area traffic is permitted to circle and then enter the area near a given destination. An effective crosstown system will free the central area of crosstown traffic, permitting the central area to function more adequately in its role.

Bypasses are designed to carry traffic through or around the urban area, removing traffic which has no desire to be in the city, thus providing relief to the city street system. Bypasses are normally designed to through-highway standards, with control of access. Occasionally, a bypass with low traffic volumes can be designed to function as a portion of an urban loop. A bypass will expedite the movement of through traffic, improving traffic conditions within the city. Since the local streets are freed for use by shopping and home-to-work travel, bypasses tend to increase the economic vitality of the local area.

Applications of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, functional classification, and the idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, a thoroughfare plan is developed for established urban areas and is constrained by the existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these constraints and the many other factors that affect major street locations.

Throughout the thoroughfare planning process, it is necessary from a practical viewpoint that the following basic principles be followed as closely as possible:

- The plan should be derived from a thorough knowledge of today's travel - its component parts, as well as factors that contribute to it, limit it, and modify it;

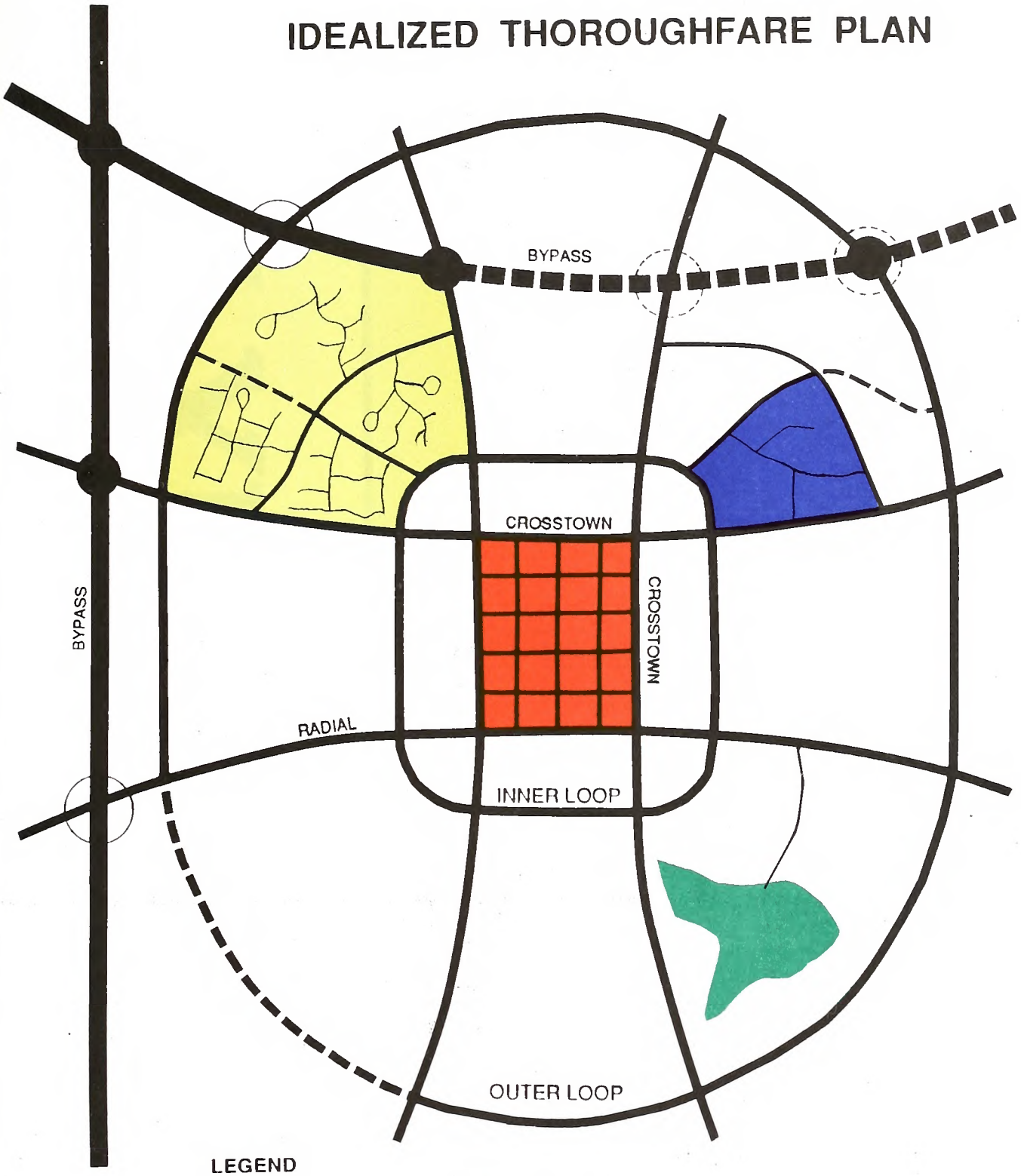
- Traffic demands must be sufficient to warrant the designation and development of each major street. The thoroughfare plan should be designed to accommodate a large portion of all major traffic movements on relatively few streets;

- The plan should conform to and provide for the land development plan of the area;

- Certain considerations must be given to urban development beyond the current planning period. Particularly in outlying or sparsely developed areas which have development potential, it is necessary to design thoroughfares on a long-range planning basis to protect right-of-way for future thoroughfare development; and

- While being consistent with the above principles and realistic in terms of travel trends, the plan must be economically feasible.

IDEALIZED THOROUGHFARE PLAN



LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE FREEWAY	▬▬▬	▬ ▬ ▬
MAJOR OTHER	▬▬▬	▬ ▬ ▬
MINOR THOROUGHFARE	▬▬▬	▬ ▬ ▬
LOCAL ROAD	▬▬▬	
INTERCHANGE	●	●
GRADE SEPERATION	○	○

LAND USES

- COMMERCIAL/BUSINESS
- RESIDENTIAL
- INDUSTRIAL
- PUBLIC/INSTITUTIONAL

FIGURE 15

APPENDIX A

Planning Area Housing and Employment

Table 15. 1996 Housing Summary						
Zone	Excellent	Above Average	Average	Below Average	Poor	Total
1	0	3	78	9	1	91
2	0	0	35	10	4	49
3	0	4	71	0	0	75
4	0	3	126	22	5	156
5	5	20	65	1	0	91
6	24	50	245	10	5	334
7	2	13	39	2	0	56
8	0	1	2	15	14	32
9	0	5	242	2	0	249
10	0	10	271	32	2	315
11	0	3	277	30	22	332
12	0	1	139	42	30	212
13	0	0	115	18	9	142
14	0	0	4	1	0	5
15	0	6	155	0	0	161
16	0	2	362	0	75	439
17	0	0	36	25	30	91
18	2	7	140	3	0	152
19	0	0	0	0	0	0
20	7	11	5	0	0	23
21	0	0	1	0	0	1
22	0	9	16	4	1	30
23	1	5	19	1	1	27
24	0	3	12	10	90	115
25	0	0	24	8	10	42
26	0	0	0	1	0	1
27	1	2	10	8	1	22
28	0	0	6	1	0	7
29	0	1	0	3	2	6
30	0	0	0	3	1	4
31	0	0	0	0	0	0
32	0	0	1	0	0	1
33	2	6	3	2	1	14
34	1	2	47	13	30	93
35	4	5	8	1	1	19
36	0	3	13	8	11	35
37	0	6	71	7	1	85
38	0	3	40	0	0	43
39	2	30	37	0	0	69
40	1	8	59	0	0	68
41	4	1	18	0	0	23
42	3	74	209	0	0	286
43	1	3	11	1	1	17
44	0	2	14	3	3	22

Table 15. 1996 Housing Summary (Cont'd)						
Zone	Excellent	Above Average	Average	Below Average	Poor	Total
45	0	0	0	0	0	0
46	0	0	7	5	12	24
47	0	1	5	1	0	7
48	0	2	10	6	2	20
49	0	5	7	9	34	55
50	0	5	34	27	22	88
51	3	1	10	1	1	16
52	0	0	10	4	0	14
53	1	3	5	0	0	9
54	1	0	122	1	4	128
55	1	0	4	0	0	5
56	0	2	32	13	22	69
57	5	27	59	0	0	91
58	0	0	66	42	48	156
59	0	2	13	11	3	29
60	0	15	87	39	21	162
61	14	114	303	0	0	431
62	2	25	96	25	16	164
63	10	29	68	3	10	120
64	56	118	12	7	14	207
65	0	2	5	3	0	10
66	0	0	10	9	33	52
67	0	0	74	0	0	74
68	28	92	48	0	0	168
69	0	1	16	0	0	17
70	27	41	13	0	0	81
71	0	0	0	0	0	0
72	1	3	8	0	0	12
73	2	16	24	0	0	42
74	1	0	124	5	78	208
75	0	0	33	15	10	58
76	0	0	0	0	0	0
77	2	6	27	32	7	74
78	0	0	0	0	0	0
79	0	0	0	0	0	0
80	0	5	96	0	0	101
81	0	1	8	2	0	11
82	0	0	0	0	0	0
83	0	0	9	0	0	9
84	0	1	4	0	0	5
85	3	6	26	1	0	36
TOTALS	217	825	4501	557	688	6788

Table 16. 1996 Employment Summary						
Zone	Industry	Retail	Special Retail	Office	Service	Total
1	15	4	0	3	21	43
2	16	4	14	0	28	62
3	165	50	1	26	161	403
4	6	0	0	0	97	103
5	0	9	0	7	73	89
6	43	38	4	50	296	431
7	80	50	5	11	196	342
8	162	0	0	1	39	202
9	0	55	23	0	87	165
10	0	0	14	0	19	33
11	0	4	0	0	74	78
12	0	1	0	0	28	29
13	0	0	7	0	3	10
14	406	0	0	0	7	413
15	0	0	0	0	7	7
16	0	3	2	4	106	115
17	0	7	51	6	21	85
18	10	64	110	15	141	340
19	28	109	47	13	97	294
20	0	0	0	0	119	119
21	30	0	0	0	491	521
22	0	0	0	0	0	0
23	22	2	0	0	4	22
24	6	0	0	0	6	12
25	81	0	0	0	0	0
26	343	14	3	0	28	388
27	17	0	0	0	1	18
28	7	0	0	0	0	7
29	61	0	0	0	0	61
30	291	0	0	0	1	292
31	500	0	0	0	0	500
32	0	0	0	0	0	0
33	0	0	0	0	0	0
34	1	0	0	0	67	68
35	0	0	0	0	0	0
36	0	0	0	0	0	0
37	0	0	0	0	0	0
38	0	0	10	0	19	29
39	0	10	16	0	121	147
40	0	2	0	0	12	14
41	0	12	0	0	28	40
42	0	155	0	0	1	156
43	0	3	0	0	0	3
44	0	12	0	0	4	16
45	1386	0	0	0	0	1386

Table 16. 1996 Employment Summary (Cont'd)						
Zone	Industry	Retail	Special Retail	Office	Service	Total
46	0	0	0	0	6	6
47	0	0	0	0	28	28
48	571	1	0	0	1	573
49	0	0	0	0	0	0
50	8	0	0	0	1	9
51	0	0	0	0	0	0
52	0	0	0	0	0	0
53	815	0	0	0	0	815
54	221	1	0	0	7	229
55	48	4	0	0	10	62
56	0	7	0	0	7	14
57	0	0	0	0	0	0
58	0	1	0	0	2	3
59	0	2	0	0	0	2
60	0	0	0	0	2	2
61	106	16	0	0	9	131
62	0	0	8	0	24	32
63	6	0	0	0	120	126
64	0	36	0	0	16	52
65	0	0	0	0	12	12
66	0	1	0	0	1	2
67	0	0	0	0	25	25
68	0	0	0	0	1	1
69	4	19	0	0	4	27
70	0	0	0	0	0	0
71	5	206	71	0	74	356
72	0	15	3	0	1	19
73	0	0	0	0	164	164
74	25	60	0	0	2	87
75	1	0	2	0	15	18
76	0	0	0	0	478	478
77	287	0	0	0	2	289
78	50	0	0	0	8	58
79	0	123	38	0	36	197
80	35	6	4	0	0	45
81	0	0	3	0	7	10
82	825	0	0	0	0	825
83	170	0	0	0	0	170
84	0	0	4	0	6	10
85	0	0	0	0	1	1
TOTALS	6853	1106	440	136	3473	12008

Table 17. 2025 Housing Summary						
Zone	Excellent	Above Average	Average	Below Average	Poor	Total
1	0	3	78	9	1	91
2	0	0	35	10	4	49
3	0	4	71	0	0	75
4	0	3	126	22	5	156
5	5	20	65	1	0	91
6	25	50	245	10	5	335
7	2	13	39	2	0	56
8	0	1	4	20	14	39
9	0	18	242	2	0	262
10	0	20	286	32	2	340
11	0	3	302	37	27	369
12	0	1	151	44	32	228
13	0	0	115	18	9	142
14	0	0	4	1	0	5
15	0	15	177	0	0	192
16	0	17	407	0	75	499
17	0	0	36	37	30	103
18	2	7	140	3	0	152
19	0	18	5	0	0	23
20	32	62	20	0	0	114
21	0	360	1	0	0	361
22	0	9	29	9	1	48
23	1	5	26	6	6	44
24	0	3	22	13	90	128
25	0	0	34	11	10	55
26	0	0	0	1	0	1
27	1	2	23	10	1	37
28	0	0	36	5	0	41
29	0	1	105	4	2	112
30	0	0	0	6	1	7
31	0	0	0	0	0	0
32	0	0	1	0	0	1
33	5	19	17	2	1	44
34	1	2	62	13	30	108
35	4	13	18	17	1	53
36	0	3	49	24	11	87
37	0	6	121	7	1	135
38	0	3	41	0	0	44
39	2	278	62	0	0	342
40	1	40	188	0	0	229
41	4	49	102	0	0	155
42	3	89	214	0	0	306
43	1	3	36	1	1	42
44	0	2	94	38	3	137
45	0	0	12	0	0	12

Table 17. 2025 Housing Summary (cont'd)						
Zone	Excellent	Above Average	Average	Below Average	Poor	Total
46	0	0	72	18	14	104
47	3	3	15	3	0	24
48	6	6	30	18	6	66
49	8	19	121	27	102	277
50	16	22	102	81	66	287
51	6	2	20	2	2	32
52	1	0	20	8	0	29
53	9	8	60	0	0	77
54	14	0	246	4	8	272
55	3	2	8	0	0	13
56	5	9	64	26	44	148
57	20	54	118	0	0	192
58	14	0	134	84	96	328
59	1	4	26	22	8	61
60	19	33	181	84	42	359
61	58	141	323	0	0	522
62	20	53	194	55	32	354
63	59	96	188	22	30	395
64	70	128	22	7	14	241
65	5	14	15	6	0	40
66	14	4	130	27	99	274
67	0	0	128	10	10	148
68	44	108	106	0	0	258
69	5	5	49	0	0	59
70	77	86	28	0	0	191
71	0	0	0	0	0	0
72	5	6	17	0	0	28
73	2	22	28	0	0	52
74	1	0	138	23	78	240
75	2	0	83	38	20	143
76	0	0	0	0	0	0
77	14	15	59	69	14	171
78	0	0	0	0	0	0
79	0	0	0	0	0	0
80	3	14.	117	0	0	134
81	4	2	16	4	0	26
82	0	0	0	0	0	0
83	0	0	18	0	0	18
84	8	7	10	0	0	25
85	3	10	52	5	0	70
TOTAL	608	2015	6779	1058	1048	11508

Table 18. 2025 Employment Summary						
Zone	Industry	Retail	Special Retail	Office	Service	Total
1	40	9	0	9	35	93
2	41	8	25	4	48	126
3	270	75	1	26	215	587
4	18	0	0	1	112	131
5	0	19	0	9	93	121
6	70	63	6	52	325	516
7	95	74	5	20	254	448
8	184	13	4	3	84	288
9	15	80	34	2	141	272
10	0	0	24	0	34	58
11	0	8	0	0	92	100
12	0	3	0	0	35	38
13	11	5	7	0	10	33
14	681	0	0	0	22	703
15	0	0	0	0	16	16
16	0	7	2	6	121	136
17	0	18	81	12	51	162
18	40	94	185	17	216	552
19	43	133	85	13	173	447
20	0	0	0	0	129	129
21	45	0	0	0	516	561
22	215	15	0	0	0	230
23	82	2	0	0	74	158
24	9	0	0	0	7	16
25	221	0	0	0	0	221
26	588	29	8	0	50	675
27	21	0	0	0	1	22
28	20	0	0	0	0	20
29	121	0	0	0	0	121
30	591	0	0	0	1	592
31	575	0	0	0	0	575
32	65	0	0	0	0	65
33	60	0	0	0	0	60
34	56	0	0	0	88	144
35	54	0	0	0	0	54
36	0	0	0	0	9	9
37	0	0	0	0	15	15
38	0	0	18	0	39	57
39	0	26	32	0	143	201
40	0	2	0	0	22	24
41	0	22	30	0	73	125
42	0	203	0	0	5	208
43	0	17	0	0	10	27
44	0	19	0	0	14	33
45	1561	0	0	0	0	1561

Table 18. 2025 Employment Summary (Cont'd)						
Zone	Industry	Retail	Special Retail	Office	Service	Total
46	0	0	0	0	42	42
47	0	0	0	0	43	43
48	721	1	0	0	1	723
49	0	4	0	0	0	4
50	38	0	0	0	1	39
51	15	0	0	0	0	15
52	10	0	0	0	0	10
53	890	0	0	0	0	890
54	346	1	0	0	17	364
55	108	4	0	0	20	132
56	0	7	0	0	23	30
57	0	0	0	0	0	0
58	0	6	0	0	9	15
59	0	5	0	0	2	7
60	0	0	0	0	6	6
61	166	16	0	0	34	216
62	0	0	24	0	29	53
63	22	0	0	0	145	167
64	30	36	0	0	25	91
65	35	4	0	0	17	56
66	0	1	0	0	4	5
67	0	0	0	0	70	70
68	0	0	0	0	4	4
69	4	47	0	0	9	60
70	0	0	0	0	0	0
71	5	236	71	0	114	426
72	0	22	3	0	4	29
73	0	0	0	0	199	199
74	45	60	0	0	2	107
75	1	0	2	0	30	33
76	0	0	0	0	600	600
77	327	0	0	0	2	329
78	125	0	0	0	8	133
79	0	153	38	0	76	267
80	35	6	4	0	15	60
81	0	0	3	0	7	10
82	972	0	0	0	0	972
83	225	0	0	0	0	225
84	6	0	4	0	9	19
85	0	0	0	0	1	1
TOTAL	9918	1553	696	174	4841	17182

APPENDIX B

Local Government & Public Participation

The local staff, government, and citizens of the City of Laurinburg and the Town of East Laurinburg were actively involved in the development of the1999 Thoroughfare Plan. Several meetings with local staff and presentations to local citizens conducted throughout the course of the study insured that the Thoroughfare Plan would meet the needs and desires of Laurinburg and East Laurinburg. In addition, the Goals & Objectives Survey administered early in the planning process offered an opportunity for the public to express their ideas and opinions regarding the transportation system.

Meetings & Presentations

November 12, 1997	Open meeting with the Laurinburg Planning Board to present an overview of the thoroughfare planning process.
July 21, 1998	Meeting with representatives of the Laurinburg Planning & Community Development Department, Zoning Department, Police Department, and Fire Department to discuss existing and anticipated deficiencies. Determination made to develop alternatives prior to presentation to Planning Board and Citizens.
September 2, 1998	Meeting with representatives of the Laurinburg Planning & Community Development Department, Zoning Department, Police Department, and Fire Department to discuss possible improvement options.
October 12, 1998	Public Information Workshop held to present proposed recommended plan and improvements to Citizens.
October 28, 1998	Meeting with representatives of the Laurinburg Planning & Community Development Department, Zoning Department, Police Department, and Fire Department to finalize proposed recommended plan and recommended improvements.
November 10, 1998	Presentation of Recommended Thoroughfare Plan to City Planning Board.
November 17, 1998	City Council called for public hearing on Recommended Thoroughfare Plan.
January 19,1999	Presentation of Recommended Thoroughfare Plan to City Council and joint Public Hearing.

Goals & Objectives Survey

A Goals and Objectives (G&O) survey is a means of determining the values of a community. This survey attempts to identify the community's perception of transportation-related issues, and may help to pinpoint concerns that should be addressed in the thoroughfare plan.

The survey is also a useful tool for the local government, engineering staff, and the community as a whole. The survey results are used to guide the development of a thoroughfare plan that will best meet the needs and values of the community.

A Goals & Objectives Survey for the Laurinburg/East Laurinburg area was conducted in 1997 as a part of the thoroughfare planning process. The methodology and results of this survey are detailed in the June, 1997 report, *Goals and Objectives Survey Results for the City of Laurinburg and the Town of East Laurinburg.*

Based upon the results of this survey, the citizens of Laurinburg and East Laurinburg take an active interest in the transportation system of the planning area. As derived from the results, it appears that community enhancements are a primary goal for the area, as is the development of new travel facilities, including new roadways. In addition, citizens are concerned with safety issues, such as perceived problem intersections.

APPENDIX C

Recommended Subdivison Ordinances

Definitions

I. Streets and Roads
   A. Rural Roads
      1. Principle Arterial: A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.
      2. Minor Arterial: A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.
      3. Major Collector: A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.
      4. Minor Collector: A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.
      5. Local Road: A road which serves primarily to provide access to adjacent land, over relatively short distances.

   B. Urban Streets
      1. Major Thoroughfares: Major thoroughfares consist of Interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.
      2. Minor Thoroughfares: Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.
      3. Local Street: A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

   C. Specific Type Rural or Urban Streets
      1. Freeway, expressway, or parkway: Divided multi-lane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is for non-commercial traffic, with full or partial control of access.
      2. Residential Collector Street: A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.
      3. Local Residential Street: Cul-de-sacs, loop streets less than 2500 ft in length, or streets less than 1.0 miles in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac: A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.
5. Frontage Road: A road that is parallel to a partial of full access controlled facility and provides access to adjacent land.
6. Alley: A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line: A line parallel to the street in front of which no structure shall be erected.

B. Easement: A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot: A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development, or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider: Any person, firm, corporation, or official agent thereof, who subdivides or develops any land deemed to be a subdivision.

B. Subdivision: All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or re-combination of portions of previously platted lots where the total number of lots is not increases and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than 10 acres where not street right-of-way dedication is involved; (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than 2 acres into not more than three lots, where not street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication: A gift, by the owner, or his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation: Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

Design Standards

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally, the proposed streets should be the extension of existing streets, if possible.

A. Right-of-Way Widths: Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

1. Rural	Minimum ROW (feet)
a. Principal Arterial	
Freeways	350
Other	200
b. Minor Arterial	100
c. Major Collector	100
d. Minor Collector	80
e. Local Road	60

2. Urban	Minimum ROW (feet)
a. Major Thoroughfare other than Freeway/Expressway	90
b. Minor Thoroughfare	70
c. Local Street	60*
d. Cul-de-Sac	Variable**

The subdivider will only be required to dedicate a maximum of 100 ft of right-of-way. In cases where over 100 ft of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 ft. In all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

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* The desirable minimum right-of-way (ROW) is 60 feet. If curb and gutter is provided, 50 feet of ROW is adequate on local residential streets.

** The ROW dimension will depend on radius used for vehicular turn around. Distance form edge of pavement of turn around to ROW should not be less than distance form edge of pavement to ROW on street approaching turn around.

A partial width right-of-way, not less than 60 ft in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider, provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths: Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:
   1. Local Residential
      Curb and Gutter section: 26 ft, face to face of curb
      Shoulder section: 20 ft to edge of pavement, 4 ft for shoulders
   2. Residential Collector
      Curb and Gutter section: 34 ft, face to face of curb
      Shoulder section: 20 ft to edge of pavement, 6 ft for shoulders

C. Geometric Characteristics: The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System of Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.
   1. Design Speed: The design speed for a roadway should be a minimum of 5 mph greater than the posted speed limit. The design speeds for subdivision type streets shall be:

Table 19. Design Speeds

Facility Type	Design Speed (km/h)		
	Desirable	Minimum	
		Level	Rolling
RURAL			
Minor Collector Roads (ADT > 2000)	60	50	40
Local Roads including Residential Collectors & Local Residential (ADT > 4000)	50	50*	40*
URBAN			
Major Thoroughfare other than Freeways or Expressways	60	50	40
Minor Thoroughfares	40	30	30
Local Streets	30	30**	20**

* Based on ADT of 400-750. Where roads serve a limited area and small number of units, can reduce minimum design speed.
** Based on projected ADT of 50-250. (Reference NCDOT Roadway Design Manual page 1-1B)

2. Maximum and Minimum Grades
   a. The maximum grades in percent shall be:

Table 20. Maximum Vertical Grade (English)

Facility Type	Design Speed (mph)	Maximum % Grade		
		Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*	20	7	10	12
	30	7	9	10
	40	7	8	10
	50	6	7	9
	60	5	6	8
	70	4	5	6
Local roads including	20	--	11	16
Residential Collectors and	30	7	10	14
Local Residential Streets*	40	7	9	12
	50	6	8	10
	60	5	6	--
URBAN				
Major Thoroughfares other	30	8	9	11
than Freeways or	40	7	8	10
Expressways	50	6	7	9
	60	5	6	8
Minor Thoroughfares*	20	9	12	14
	30	9	11	12
	40	9	10	12
	50	7	8	10
	60	6	7	9
	70	5	6	7
Local Streets*	20	--	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	--

* For streets and roads with projected annual average daily traffic less than 250 of short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table. (Reference NCDOT Roadway Metric Design Manual page 1-12 T-3).

   b. Minimum grade should not be less than 0.5%.
   c. Grades for 30 meters (100 feet) each way from intersections (measured from edge of pavement) should not exceed 5%.
3. Minimum Sight Distance: In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

Table 21. Sight Distance				
Design Speed (mph)	**30**	**40**	**50**	**60**
Stopping Sight Distance:				
Minimum (feet)	200	275	400	525
Desirable (feet)	200	325	475	650
Minimum K* Value for:				
Crest curve	30	60	110	190
Sag curve	40	60	90	120
Passing Sight Distance:				
Minimum Passing Distance for two lanes (feet)	1,100	1,500	1,800	2,100

(General practice call for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)
(Reference NCDOT Roadway Design Manual page 1-12 T-1)

K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with A Policy of Geometric Design of Highways and Streets, 1990.

4. The "Superelevation Table" shown below shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevations (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

Table 22. Superelevation Table			
Design Speed (mph)	**Maximum e**	**Minimum Radius (ft)**	**Maximum Degree of Curve**
30	0.04	302	19 00'
40	0.04	573	10 00'
50	0.04	955	6 00'
60	0.04	1,637	3 45'
30	0.06	273	21 00'
40	0.06	521	11 15'
50	0.06	955	6 45'
60	0.06	1,432	4 15'
30	0.08	260	22 45'
40	0.08	477	12 15'
50	0.08	819	7 30'
60	0.08	1,146	4 45'

e = rate of roadway superelevation, foot per foot (Reference NCDOT Roadway Design Manual page 1-12 T-6 through T-8)

D. Intersections

1. Streets shall be laid out so as to intersection as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five degrees (65%).

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersection streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.
3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 200 feet between survey center lines.

E. Cul-de-Sacs

Cul-de-sacs shall not be more than 500 feet in length. The distance form the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance form the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.
2. The width of an alley shall be at least 20 feet.
3. Dead end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn-around facilities at the dead end as may be required by the Planning Board.

G. Permits for Connection to State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets to Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

I. Wheelchair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provided wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Decks

1. The clear roadway widths for new and reconstructed bridges serving tow-lane, two-way traffic should be as follows:
   a. Shoulder section approach
      i. Design year ADT < 800: Minimum 28 ft width face to face of parapets, rails, or pavement width, plus 10 ft, whichever is greater.
      ii. Design year ADT between 800-2000: Minimum 34 ft width face to face of parapets, rails, or pavement width, plus 12 ft, whichever is greater.
      iii. Design year ADT > 2000: Minimum width of 40 ft, desirable width of 44 ft width face to face of parapets or rails.
   b. Curb and gutter approach
      i. Design year ADT < 800: Minimum 24 ft face to face of curbs.
      ii. Design year ADT > 800: Width of approach pavement measured face to face of curbs.

      Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 1.5 ft, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having four or more lanes serving undivided tow-way traffic should be as follows:
   a. Shoulder section approach: Width of approach pavement plus width of useable shoulders on the approach left and right. (Shoulder width 8 ft minimum, 10 ft desirable.)
   b. Curb and gutter approach: Width of approach pavement measured face to face of curbs.

APPENDIX D

Typical Thoroughfare Cross-Sections

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfare are not practical. Each street section must be individually analyzed and its cross section requirements determined on the basis of amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

Typical cross section recommendations are shown in **Figure 16**. These cross sections are typical for facilities on new location, where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project.

Recommended typical cross sections for thoroughfares were derived on the basis of projected traffic, existing capacities, desirable levels, and available right-of-way. These recommendations given in Appendix D.

Cross sections "A" and "L" are typical for controlled access freeways. The 46-foot grassed median is the minimum desirable median width, but may vary depending upon design considerations. Right-of-way requirements would typically vary upward from 228 feet, depending upon cut and fill requirements.

Cross section "B", seven lane curb and gutter, should not be used for new projects. When the conditions warrant six lanes, cross section "D" should be recommended. Cross section "B" should be used only in special situations such as when widening from a five lane section and right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "D" is the final cross section.

Cross sections "C" and "C-1", five lane roadways, are typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "D", "E", and "M" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections. The 16-foot median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases, grassed or landscaped medians may be used in urban areas. However, these types of medians result in greatly increased maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

Cross section "F" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 24 feet is recommended with 30 feet being desirable.

Cross section "G" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would

probably be required at major intersections. This cross section should be used only if the above criteria are met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

In urban environments, thoroughfares which have high volumes of left turning traffic and provide access to adjacent development typically require cross section "H". Cross sections "I" and "J" are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. Cross section "I" would be used on those minor thoroughfare where parking on both sides is needed as a result of more intense development.

Cross section "K" is used in rural areas or for staged construction of a wider multi-lane cross section. On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 100 feet should be required. In some instances, local ordinances may not allow the full 100 feet. In those cases, 70 feet should be preserved with the understanding that the full 100 feet will be preserved by use of building setbacks and future street line ordinances.

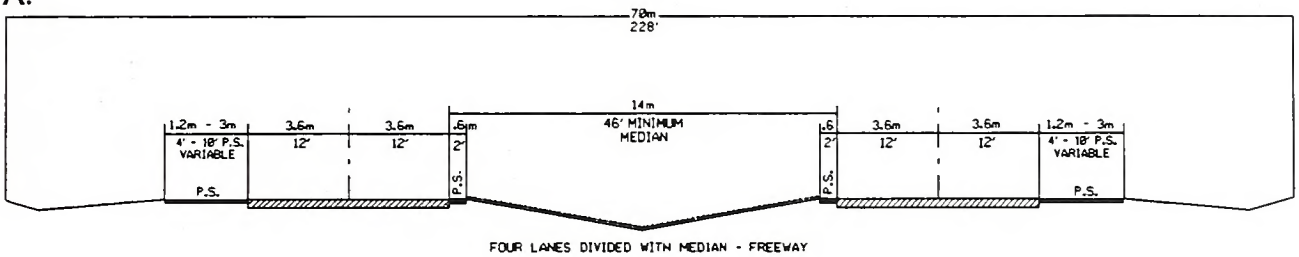
The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The rights-of-ways shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may necessitate either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. Cross sections "N", "O", and "P" are typically used to accommodate bicycle travel.

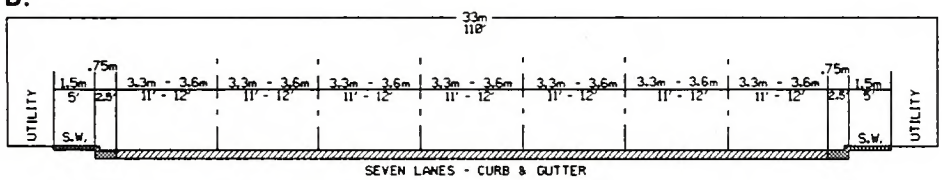
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



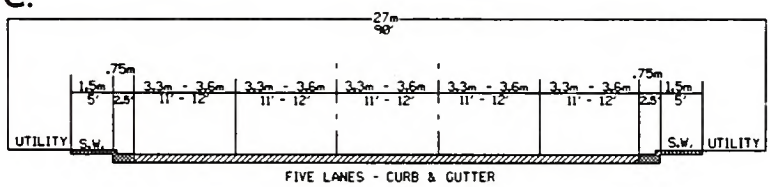
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



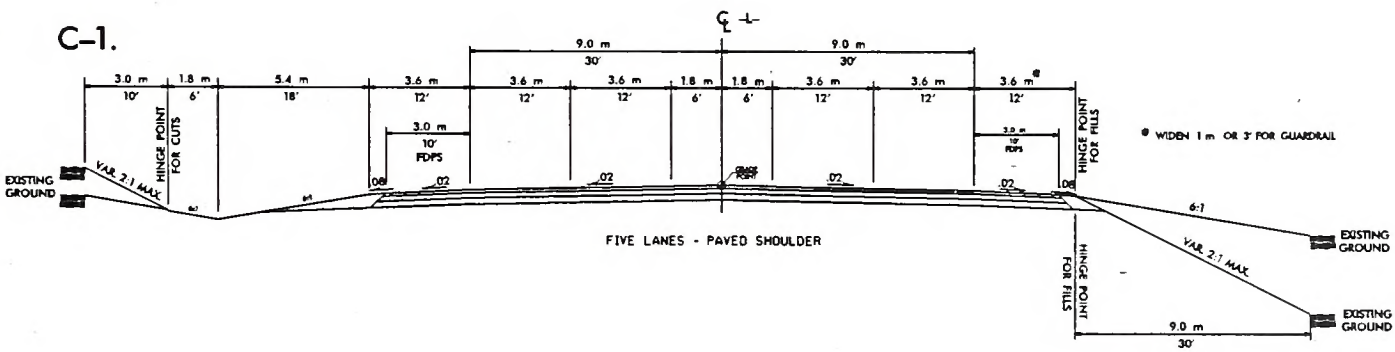
SEVEN LANES - CURB & GUTTER

C.



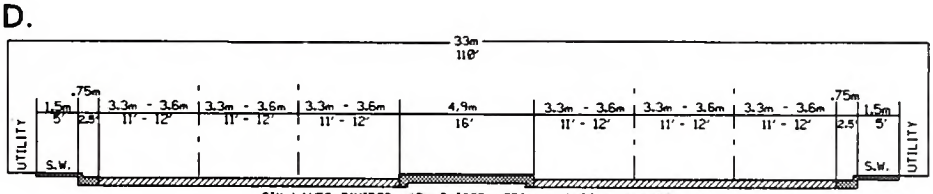
FIVE LANES - CURB & GUTTER

C-1.



FIVE LANES - PAVED SHOULDER

D.

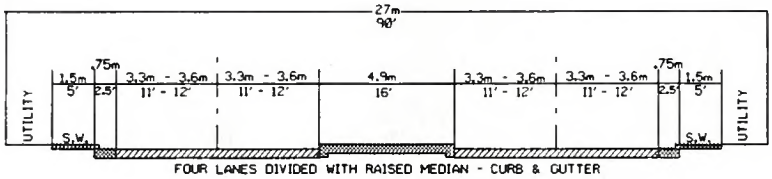


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE 16

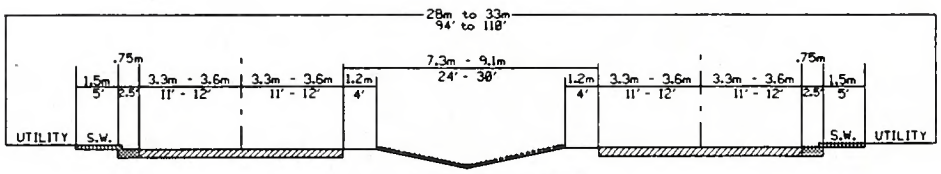
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



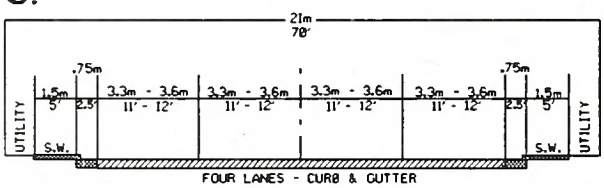
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



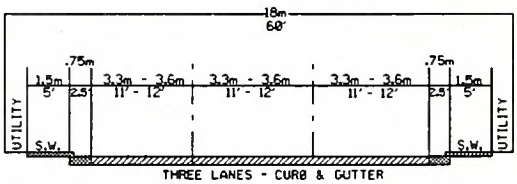
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



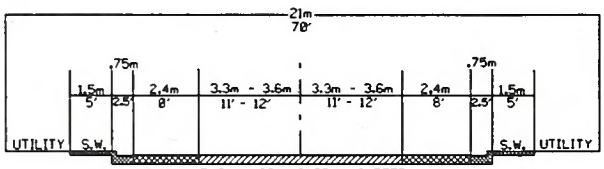
FOUR LANES - CURB & GUTTER

H.



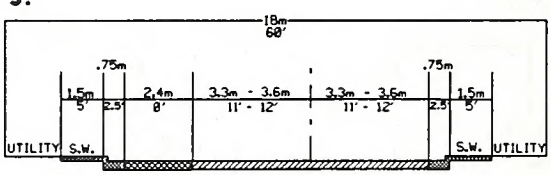
THREE LANES - CURB & GUTTER

I.



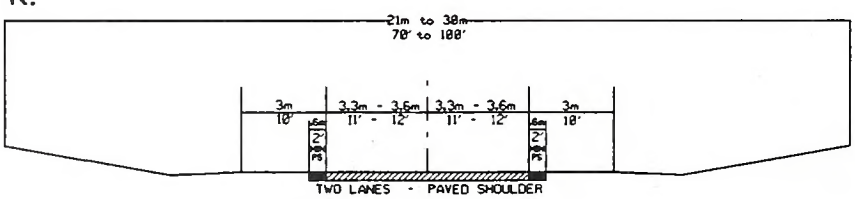
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

K.



TWO LANES - PAVED SHOULDER

APPENDIX E

Thoroughfare Plan Street Tabulations & Recommendations

Facility & Segment		♦♦♦ EXISTING ROADWAY SYSTEM ♦♦♦						♦♦ PROPOSED ROADWAY SYSTEM ♦♦			
From	To	Distance (mi)	Roadway Cross-Section (ft)	lanes	ROW (ft)	Capacity (vpd)	AADT (vpd)	Capacity (vpd)	AADT (vpd)	Cross-Section	ROW (ft)
Aberdeen Rd (US 15-501 Bus)											
Wagram Rd (US 401 Bus)	Laurinburg City Limits	0.42	48	2	80.0	10900	N/A	10900	5300	ADQ	ADQ
Laurinburg City Limits	South of US 15-401 Byp	0.26	22	2	60.0	10900	N/A	10900	6500	K	70.0
South of US 15-401 Byp	US 15-401 Byp	0.18	36	2	60.0	10900	2800	10900	5100	ADQ	ADQ
Armory St (SR 1640) ***BIGGS ST EXTENSTION***											
Main St	Biggs St (SR 1641)	0.06	36	2	N/A	12000	N/A	19000	3800	J	60.0
Atkinson St (SR 1107)											
Gill St (SR 1107)	0.46 mi south of Gill St	0.46	40	2	N/A	12000	N/A	19000	4800	J	ADQ
0.46 mi south of Gill St	1.17 mi north of Main St	0.15	36	2	N/A	12000	N/A	19000	1000	J	ADQ
1.17 mi north of Main St	Main St (SR 1477)	1.17	41	2	N/A	12000	N/A	19000	1000	J	ADQ
Barnes Bridge Rd (SR 1614)											
Harry Malloy Rd (SR 1609)	Highland Rd Ext (Eastern Loop)	0.52	22	2	N/A	11000	1800	12000	300	K	70.0
Highland Rd Ext (Eastern Loop)	Shaw Rd Ext (Eastern Loop)	4.09	22	2	N/A	11000	1800	12000	5300	K	70.0
Shaw Rd Ext (Eastern Loop)	Laurinburg City Limits	0.65	22	2	N/A	11000	1800	12000	1300	K	70.0
Laurinburg City Limits	Laurinburg City Limits	0.66	22	2	N/A	11000	N/A	12000	4000	K	70.0
Laurinburg City Limits	US 15-401 (McColl Rd)	1.65	22	2	N/A	10900	800	12000	4000	K	70.0
Biggs St (SR 1641/SR 1642/SR 1643)											
Armory St (SR 1640)	Maple St	0.10	33	2	N/A	12000	N/A	19000	3800	J	60.0
Maple St	Tucker St	0.58	40	2	N/A	12000	N/A	19000	3600	J	60.0
Tucker St	Church St (US 74 Bus)	0.60	33	2	N/A	12000	N/A	19000	5300	J	60.0
Church St (US 74 Bus)	Bizzell St	0.28	41	2	50.0	12000	N/A	19000	4600	J	60.0
Bizzell St	Pine St	0.05	30	2	N/A	12000	N/A	19000	4600	J	60.0
Blues Farm Rd (SR 1117)											
US 15-401 (McColl Rd)	1.87 mi east of US 15-401	1.87	22	2	N/A	10400	4500	11000	7500	K	70.0
1.87 mi east of US 15-401	X-way Rd (SR 1108)	0.11	30	2	N/A	10400	4500	10400	6700	ADQ	ADQ
Blues Woods Rd (SR 1116)											
X-way Rd (SR 1108)	Lytch Drive	0.49	20	2	N/A	9700	N/A	9700	4500	K	70.0
Lytch Drive	Turnpike Rd (SR 1105)	2.10	20	2	N/A	10900	N/A	10900	1000	ADQ	ADQ
Caledonia Rd (SR 1433/SR 1438)											
McGirt's Bridge Rd (SR 1471)	Old Lumberton Rd (SR 1438)	0.38	48	4	60.0	12200	3500	12200	6300	ADQ	ADQ
Old Lumberton Rd (SR 1438)	Railroad	0.23	26	2	60.0	12200	N/A	12200	7800	ADQ	ADQ
Railroad	Church St (US 74 Bus)	0.25	18	2	60.0	10500	5700	12000	7600	K	70.0
Church St (US 74 Bus)	Taft St	0.43	24	2	N/A	12200	5300	12000	4300	ADQ	ADQ
Taft St	US 74 Byp	0.85	44	2	60.0	12200	N/A	12200	5900	ADQ	ADQ
Caledonia Rd (US 501 Byp)											
US 501(John's Rd)	US 74 Byp	0.63	24	2	100.0	11300	5500	11300	7000	ADQ	ADQ
Calhoun Rd (SR 1119)											
Blues Woods Rd (SR 1116)	NC 79	1.74	18	2	N/A	10900	920	10900	3000	K	70.0

Facility & Segment			♦♦♦ EXISTING ROADWAY SYSTEM ♦♦♦					♦♦♦ PROPOSED ROADWAY SYSTEM ♦♦♦			
From	To	Distance (mi)	Roadway Cross-Section (ft)	lanes	ROW (ft)	Capacity (vpd)	AADT (vpd)	Capacity (vpd)	AADT (vpd)	Roadway oss-Secti	ROW (ft)
Church St (US 74 Bus)											
Highland Rd (SR 1323)	Kiser Rd (SR 1452)	0.34	22	2	100.0	10500	N/A	16000	9300	H	ADQ
Kiser Rd (SR 1452)	Caledonia Rd (SR 1438)	1.37	24	2	60.0	10500	5800	16000	8900	H	ADQ
Caledonia St (SR 1438)	Biggs St (SR 1642)	0.25	24	2	60.0	10500	10400	16000	17000	H	ADQ
Biggs St (SR 1642)	Main St (US 15-401-501 Bus)	0.07	24	2	100.0	10500	10400	16000	15000	H	ADQ
Main St (US 15-401-501 Bus)	Frontage Rd (SR 1358)	0.79	24	2	100.0	10500	9100	16000	13100	H	ADQ
Frontage Rd (SR 1358)	US 15-401-501 Byp	0.13	24	2	100.0	10500	9100	16000	11000	H	ADQ
US 15-401-501 Byp	Turnpike Rd (SR 1105)	0.50	24	2	60.0	10500	9600	16000	17000	H	ADQ
Turnpike Rd (SR 1105)	NC 79	0.04	24	2	60.0	10500	8800	16000	15000	H	ADQ
NC 79	Fiedlcrest Rd (SR 1303)	0.60	24	2	60.0	10500	6200	16000	9100	H	ADQ
Dixie Guano Rd (SR 1645)											
Highland Rd (SR 1323)	0.60 mi east of Highland Rd	0.60	18	2	N/A	10900	N/A	10900	4000	K	70.0
0.60 mi east of Highland Rd	Church St (US 74 Bus)	0.20	24	2	N/A	10900	N/A	10900	1400	ADQ	ADQ
E. Vance St		0.00									
S. Caledonia Rd (SR 1438)	Main St (SR 1477)	0.40	28	2	N/A	9800	N/A	9800	4000	ADQ	ADQ
Main St	Atkinson St	0.00	28	2	N/A	9800	N/A	9800	4800	ADQ	ADQ
Elmore Rd (SR 1321)											
US 74	NC 79	1.10	18	2	N/A	10900	N/A	10900	2700	K	70.0
Fieldcrest Rd (SR 1303)											
US 74 Bus	Old Wire Rd (SR 1319)	3.15	24	2	N/A	10900	1200	10900	5900	ADQ	ADQ
Ford Dr											
Main St	US 15-401 Byp	0.25	33	2	N/A	12000	N/A	12000	8700	ADQ	ADQ
Fourth St											
Church St (US 74 Bus)	Old Lumberton Rd (SR 1438)	0.50	18	2	N/A	10500	N/A	10500	N/A	ADQ	ADQ
Gill St (SR 1107) B8											
US 15 Bus	Atkinson St	0.44	24	2	N/A	1200	N/A	1900	3100	J	60.0
Harry Malloy Rd (SR 1609)											
Stewartsville Rd (SR 1601)	Barnes Bridge Rd (SR 1614)	0.95	18	2	N/A	10900	N/A	10900	4200	K	70.0
Barnes Bridge Rd (SR 1614)	Rock Ford Rd (SR 1610)	0.52	18	2	N/A	10900	N/A	10900	4500	K	70.0
Rock Ford Rd (SR 1610)	Patterson Rd (SR 1611)	0.97	22	2	N/A	10900	N/A	10900	N/A	ADQ	ADQ
Hasty Rd (SR 1615)											
SPAB	Laurinburg City Limits	2.94	20	2	N/A	10900	2200	10900	5700	K	70.0
Laurinburg City Limits	0.43 mi north of City Limits	0.43	20	2	N/A	10900	3600	10900	4800	K	70.0
0.43 mi north of City Limits	US 15-401 (McColl Rd)	0.02	30	2	N/A	10900	N/A	10900	4600	ADQ	ADQ
US 15-401 (McColl Rd)	0.02 north of US 15-501	0.02	30	2	N/A	10900	3400	10900	2900	ADQ	ADQ
0.02 north of US 15-501	Turnpike Rd (SR 1105)	0.31	18	2	N/A	10900	N/A	10900	2800	K	70.0
Highland Rd (SR 1323)											
US 401	0.06 mi south of US 401	0.06	30	2	60.0	10900	2700	12000	8000	ADQ	ADQ
0.06 mi south of US 401	0.24 mi north of SR 1433	0.65	24	2	60.0	10900	3200	12000	6600	ADQ	ADQ
0.24 mi north of SR 1433	McGirt's Bridge Rd (SR 1433)	0.24	20	2	N/A	10900	N/A	12000	6600	K	70.0

Facility & Segment			♦♦♦ EXISTING ROADWAY SYSTEM ♦♦♦					♦♦♦ PROPOSED ROADWAY SYSTEM ♦♦♦			
From	To	Distance (MI)	Roadway Cross-Section (ft)	lanes	ROW (ft)	Capacity (vpd)	AADT (vpd)	Capacity (vpd)	AADT (vpd)	Cross-Section	ROW (ft)
Highland Rd (SR 1323)											
McGirt's Bridge Rd (SR 1433)	Leith's Creek	1.74	20	2	N/A	10900	1800	12000	6300	K	70.0
Leith's Creek	US 74 Business	0.32	20	2	N/A	10900	1800	12000	6300	K	70.0
US 74 Business	0.39 mi south of US 74 Bus	0.39	24	2	N/A	10900	N/A	12000	8900	ADQ	ADQ
0.39 mi south of US 74 Bus	US 74 Byp	0.20	36	2	N/A	10900	2000	12000	7600	ADQ	ADQ
US 74 Byp	0.10 mi south of US 74 Byp	0.10	24	2	N/A	10900	1500	12000	5600	ADQ	ADQ
0.10 mi south of US 74 Byp	Harry Malloy Rd (SR 1609)	0.59	22	2	N/A	10900	N/A	12000	5200	K	70.0
Harry Malloy Rd (SR 1609)	Barnes Bridge Rd (SR 1614)	0.65	-	-	-	-	-	12000	5000	K	70.0
John's Rd (US 501 Business)											
Caledonia Rd (US 501 Byp)	Lauchwood Dr (SR 1674)	0.35	24	2	60.0	11350	2600	11350	4200	ADQ	ADQ
Lauchwood Dr (SR 1674)	Main St (US 15-401-501 Bus)	0.94	24	2	60.0	11350	3900	11350	5500	ADQ	ADQ
King St (SR 1300)											
US 74 Bus	0.18 mi north of US 74 Bus	0.18	27	2	60.0	10500	N/A	10500	3200	ADQ	ADQ
0.18 mi north of US 74 Bus	Railroad St (SR 1383)	0.05	40	4	60.0	10500	N/A	10500	3200	ADQ	ADQ
Railroad St (SR 1383)	US 15-401 Byp	0.40	40	4	60.0	10500	N/A	10500	5600	ADQ	ADQ
Kiser Rd (SR 1452)											
Church St (US 74 Bus)	Old Lumberton Rd (SR 1438)	1.00	16	2	N/A	10500	950	12000	2400	K	70.0
Lauchwood Drive (SR 1674)											
John's Rd (US 501)	Main St (SR 1477)	1.05	22	2	80.0	11000	N/A	12000	2700	H	60.0
Laurel Hill Church Rd (SR 1321)											
Old Wire Rd (SR 1319)	US 74	3.10	18	2	N/A	10900	700	10900	2700	K	70.0
Lees Mill Rd (SR 1425)											
EPAB	Highland Rd (SR 1323)	1.51	22	2	N/A	10900	1900	10900	3400	K	70.0
Highland Rd (SR 1323)	Produce Market Rd (SR 1439)	0.96	24	2	N/A	10900	3000	10900	4000	ADQ	ADQ
Produce Market Rd (SR 1439)	US 401 Bus	0.55	22	2	N/A	10900	2900	10900	2300	K	70.0
Main St (US 15-401 Business)											
US 15-401 Byp	US 74 Byp	0.51	52	5	100.0	24000	11500	24000	20700	ADQ	ADQ
US 74 Byp	US 501 Bus (John's Rd)	1.35	44	4	100.0	21000	18700	24000	9700	C	ADQ
US 501 Bus (John's Rd)	Church St (US 74 Bus)	0.71	47	3	60.0	11300	14800	11300	5100	ADQ	ADQ
Church St (US 74 Bus)	RailRd St (SR 1383)	0.28	36	3	100.0	11300	8500	11300	2700	ADQ	ADQ
Railroad St (SR 1383)	Aberdeen Rd (US 15-501 Bus)	0.52	24	3	100.0	11300	10600	11300	2900	ADQ	ADQ
Main St (US 15-401)											
Blues Farm Rd (SR 1117)	US 15-401 Byp	0.51	62	5	150.0	24000	N/A	24000	32000	ADQ	ADQ
McArn Rd (SR 1369)											
EPAB	Old Lumberton Rd (SR 1438)	1.71	24	2	N/A	11000	2300	11000	4000	ADQ	ADQ
Old Lumberton Rd (SR 1438)	Caledonia Rd (SR 1433)	1.88	18	2	N/A	11000	960	11000	2300	K	70.0
McColl Rd (US 15-401)											
SPAB	Laurinburg City Limits	3.10	24	2	150.0	11350	5500	22000	13500	C-1	150.0
Purcell Rd (SR 1177)	Turnpike Rd (SR 1105)	1.53	24	2	150.0	21000	10200	22000	12500	C-1	150.0
Turnpike Rd (SR 1105)	Blues Farm Rd (SR 1117)	0.44	62	4	150.0	21000	14400	22000	2200	C-1	150.0

Facility & Segment			♦♦♦ EXISTING ROADWAY SYSTEM ♦♦♦					♦♦♦ PROPOSED ROADWAY SYSTEM ♦♦♦			
From	To	Distance (mi)	Roadway Cross-Section (ft)	lanes	ROW (ft)	Capacity (vpd)	AADT (vpd)	Capacity (vpd)	AADT (vpd)	Cross-Section	ROW (ft)
McFarland Rd (SR 1323)											
US 15-501	Laurinburg City Limits	1.00	24	2	60.0	10900	1200	10900	2600	ADQ	ADQ
McFarland Rd (SR 1323)											
Laurinburg City Limits	0.65 mi south of City Limits	0.65	24	2	60.0	10900	1200	10900	2000	ADQ	ADQ
0.65 mi south of City Limits	US 401	0.06	30	2	60.0	10900	1200	10900	3400	ADQ	ADQ
McGirts Bridge Rd (SR 1433)											
EPAB	McArn Rd (SR 1369)	1.55	22	2	N/A	10900	1500	10900	3000	K	70.0
McArn Rd (SR 1369)	0.46 mi east of McArn Rd	0.46	22	2	N/A	10900	N/A	10900	4900	K	70.0
0.46 mi east of McArn Rd	Produce Market Rd (SR 1439)	0.07	44	4	N/A	10900	1200	10900	1400	ADQ	ADQ
Produce Market Rd (SR 1439)	McGirt's Bridge Rd (SR 1471)	0.44	44	4	N/A	10900	3600	10900	2200	ADQ	ADQ
McGirts Bridge Rd (SR 1471)											
Caledonia Rd (SR 1433)	Main St (SR 1477)	0.52	43	2	N/A	12200	3000	12200	3100	ADQ	ADQ
McQueen Rd (SR 1621)											
John's Rd (US 501)	SR 1620	1.10	20	2	N/A	10900	630	10900	1500	ADQ	ADQ
SR 1620	Hasty Rd (SR 1615)	1.60	18	2	N/A	10900	630	10900	1000	ADQ	ADQ
N. Rocky Ford Rd (SR 1611)											
US 74 Bus	McArn Rd (SR 1369)	0.61	24	2	N/A	10900	2400	10900	8100	ADQ	ADQ
NC 79		0.00									
US 74 Bus	Laurinburg City Limits	0.35	24	2	100.0	10900	N/A	10900	6300	ADQ	ADQ
Laurinburg City Limits	WPAB	3.15	24	2	100.0	10900	1900	10900	8000	ADQ	ADQ
Northwest Connector											
US 15-401-501 Byp	US 74	2.80	-	-	-	-	-	12000	7600	K	70.0
Old Lumberton Rd (SR 1438)											
Caledonia Rd (SR 1433)	Produce Market Rd (SR 1439)	0.57	20	2	60.0	11000	N/A	11000	2000	K	70.0
Produce Market Rd (SR 1439)	Kaiser Rd (SR 1452)	0.36	20	2	60.0	11000	N/A	11000	4000	K	70.0
Kaiser Rd (SR 1452)	Highland Rd (SR 1323)	0.25	20	2	60.0	10900	N/A	11000	4000	K	70.0
Highland Rd (SR 1323)	McArn Rd (SR 1369)	1.28	20	2	60.0	10900	1000	11000	2000	K	70.0
Patterson Rd (SR 1611)											
SPAB	Rock Ford Rd (SR 1610)	1.53	22	2	N/A	10900	740	10900	1800	ADQ	ADQ
Peden St											
Sunset Dr	Church St (US 74 Bus)	0.70	33	2	N/A	12000	N/A	12000	N/A	ADQ	ADQ
Pine St											
Bizzell St	Dickson St	0.14	16	2	N/A	10900	N/A	19000	4200	J	60.0
Dickson St	Aberdeen Rd (US 15-501 Bus)	0.45	-	-	-	-	-	12000	4500	J	60.0
Plaza Rd											
Main St	US 15-401-501 Byp	0.55	42	2	N/A	12000	N/A	12000	500	ADQ	ADQ
Produce Market Rd (SR 1439)											
US 401 Bus (Wagram Rd)	Old Lumberton Rd (SR 1438)	1.55	18	2	N/A	11000	1400	11000	3600	K	70.0
Purcell Rd (SR 1177)											
US 15-401	Blues Farm Rd (SR 1117)	1.69	20	2	N/A	10500	N/A	10500	N/A	ADQ	ADQ

Facility & Segment			♦♦♦ EXISTING ROADWAY SYSTEM ♦♦♦					♦♦♦ PROPOSED ROADWAY SYSTEM ♦♦♦			
From	To	Distance (mi)	Roadway Cross-Section (ft)	lanes	ROW (ft)	Capacity (vpd)	AADT (vpd)	Capacity (vpd)	AADT (vpd)	Cross-Section	ROW (ft)
Railroad St (SR 1383)											
Turnpike Rd (SR 1105)	Gill St (SR 1107)	1.38	20	2	N/A	12200	580	12200	2400	K	70.0
Gill St (SR 1107)	Main St (SR 1477)	0.20	32	2	N/A	12200	5000	12200	1000	ADQ	ADQ
Rea Magnet Rd (SR 1302)											
Sneads Grove Rd (SR 1300)	Watch Plant Rd (SR 1301)	0.91	18	2	N/A	10500	500	10500	1300	ADQ	ADQ
Rocky Ford Rd (SR 1610)											
Rocky Ford Rd (SR 1611)	Harry Malloy Rd (SR 1609)	0.90	18	2	N/A	10900	N/A	10900	4200	K	70.0
S. Rocky Ford Rd (SR 1611)											
Rock Ford Rd (SR 1610)	US 74 Bus	0.24	20	2	N/A	10900	3500	10900	7300	K	70.0
Sneads Grove Rd (SR 1105)											
Wire Rd (SR 1319)	Old Laurel Hill Rd (SR 1321)	1.70	20	2	N/A	10900	N/A	10900	2700	K	70.0
Old Laurel Hill Rd (SR 1321)	King St (SR 1300)	0.45	20	2	N/A	10900	N/A	10900	2200	K	70.0
Sneads Grove Rd (SR 1300)											
US 15-501 Byp	Turnpike Rd (SR 1105)	1.72	20	2	70.0	10900	2000	10900	1500	ADQ	ADQ
Shaw Rd (SR 1627)											
Barnes Bridge Rd (SR 1614)	End of existing pavement	0.40	20	2	60.0	10900	N/A	12000	700	K	70.0
End of existing pavement	US 15-401	0.50	-	-	-	-	-	12000	400	K	70.0
Stewartsville Cemetery Rd (SR 1613)											
SPAB	Harry Malloy Rd (SR 1609)	2.49	20	2	N/A	10900	610	10900	1000	ADQ	ADQ
Stewartsville Rd (SR 1601)											
S. Caledonia Rd (SR 1438)	US 74 Byp	1.12	18	2	N/A	10500	1900	10500	1000	ADQ	ADQ
US 74 Byp	US 501 (John's Rd)	4.12	18	2	N/A	10900	760	10500	2100	K	70.0
Sunset Drive											
Atkinson St	Peden St	0.70	27	2	N/A	10500	N/A	10500	N/A	ADQ	ADQ
Turnpike Rd (SR 1105)											
King St (SR 1300)	High School Rd (SR 1383)	1.50	18	2	N/A	10900	520	10900	1300	ADQ	ADQ
High School Rd (SR 1383)	Patterson Circle	0.21	18	2	N/A	10900	2600	10900	1200	ADQ	ADQ
Patterson Circle	Blues Woods Rd (SR 1116)	1.76	18	2	N/A	10900	N/A	10900	2600	K	70.0
Blues Woods Rd (SR 1116)	West Boulevard (SR 1108)	0.43	20	2	N/A	10900	N/A	10900	1300	ADQ	ADQ
West Boulevard (SR 1108)	Blues Farm Rd (SR 1117)	0.97	20	2	N/A	10900	3200	10900	3600	K	70.0
Blues Farm Rd (SR 1117)	US 15-401 (McColl Rd)	0.83	20	2	N/A	10900	N/A	10900	2100	K	70.0
US 15-401 (McColl Rd)	0.55 mi south of US 15-401	0.55	20	2	N/A	10900	N/A	10900	4000	K	70.0
0.55 mi south of US 15-401	Old Barnes Bridge Rd (SR 1614)	1.29	18	2	N/A	10900	N/A	10900	1800	ADQ	ADQ
US 15-401 Byp											
US 15-401	US 74 Byp	0.52	62	4	220.0	21000	11300	21000	20000	ADQ	ADQ
US 15-401-501 Byp											
US 74 Byp	West Boulevard (SR 1108)	0.41	48	4	220.0	29000	12400	29000	27000	ADQ	ADQ
West Boulevard (SR 1108)	US 74 - NC 79	0.82	48	4	200.0	29000	10400	29000	17000	ADQ	ADQ
US 74 - NC 79	US 401 Byp	3.48	48	4	200.0	29000	10200	29000	21600	ADQ	ADQ

Facility & Segment			♦♦♦ EXISTING ROADWAY SYSTEM ♦♦♦					♦♦♦ PROPOSED ROADWAY SYSTEM ♦♦♦			
From	To	Distance (mi)	Roadway Cross-Section (ft)	lanes	ROW (ft)	Capacity (vpd)	AADT (vpd)	Capacity (vpd)	AADT (vpd)	Cross-Section	ROW (ft)
US 15-501											
US 15-401-501 Byp	Laurinburg City Limits	0.96	36	2	100.0	10900	9000	10900	18000	ADQ	ADQ
Laurinburg City Limits	NPAB	0.23	36	2	100.0	10900	N/A	10900	8000	ADQ	ADQ
US 401											
US 401 Byp	NPAB	2.97	36	2	220.0	11300	6600	28000	15700	F	250.0
US 401 Byp											
US 401	US 15-401-501 Byp	1.40	48	4	220.0	29000	7200	29000	16000	ADQ	ADQ
US 501											
SPAB	Caledonia Rd (US 501 Byp)	3.21	24	2	60.0	10500	6600	12000	11000	ADQ	ADQ
US 74											
WPAB	US 74 Business	2.10	24	2	100.0	2100	19000	52000	41500	A	ADQ
US 74 Business											
EPAB	0.25 mi east of US 74 Byp	1.53	22	2	100.0	10500	5900	12000	12400	K	ADQ
0.25 mi east of US 74 Byp	US 74 Byp	0.25	22	2	100.0	10500	6400	12000	15000	K	ADQ
US 74 Byp	Highland Rd (SR 1323)	1.17	22	2	100.0	10500	5700	12000	15000	K	ADQ
Fieldcrest Rd (SR 1303)	US 74	0.50	48	4	100.0	24000	N/A	24000	17600	ADQ	ADQ
US 74 Byp											
EPAB	US 74 Business	4.27	48	4	200.0	45000	12000	45000	31000	ADQ	ADQ
US 74 Business	Caledonia Rd (US 501 Byp)	2.61	48	4	200.0	45000	14000	45000	32000	ADQ	ADQ
Caledonia Rd (US 501 Byp)	Western Laurinburg City Limits	2.20	48	4	200.0	45000	8200	45000	31000	ADQ	ADQ
Western Laurinburg City Limits	US 74 Bus	1.55	48	4	200.0	45000	15700	45000	28700	ADQ	ADQ
Wagram Rd (US 401 Business)											
Aberdeen Rd (US 15-501 Bus)	US 401	1.85	20	2	100.0	11350	3300	11350	4500	K	70.0
Watch Plant Rd (SR 1301)											
US 15-501	Rae Maget Rd (SR 1302)	0.40	24	2	N/A	12000	2200	12000	3400	ADQ	ADQ
Rae Maget Rd (SR 1302)	Laurel Hill Rd (SR 1321)	1.40	18	2	N/A	10500	400	10500	1200	ADQ	ADQ
West Boulevard (SR 1108)											
Turnpike Rd (SR 1105)	0.10 mi south of US 15-501Byp	0.64	24	2	60.0	12000	5800	12000	14600	ADQ	ADQ
0.10 mi south of US 15-501Byp	US 15-501 Byp	0.10	60	5	60.0	21000	N/A	21000	19800	ADQ	ADQ
US 15-501 Byp	Asheville St (SR 1110)	0.50	39	3	60.0	12000	9100	12000	7400	ADQ	ADQ
Asheville St (SR 1110)	Atkinson St	0.43	29	2	60.0	12000	5300	12000	6200	ADQ	ADQ
Atkinson St	Main St (SR 1477)	0.07	29	2	60.0	12000	N/A	12000	5200	ADQ	ADQ
X-Way Rd (SR 1108)											
PAB	Gum Swamp	1.99	20	2	60.0	10900	3300	12000	9000	K	70.0
Gum Swamp	Turnpike Rd (SR 1105)	2.43	20	2	60.0	10900	3000	12000	11400	K	70.0

APPENDIX F

Definitions of Environmental Status Codes

Definitions Of Environmental Status Codes: Natural Heritage Program Plant List*

North Carolina Status	Description
E Endangered	"Any species or higher taxon of plant whose continued existence as a viable component of the States flora is determined to be in jeopardy" (GS 19B 106: 202.12). (Endangered species may not be removed from the wild except when a permit is obtained for research, propagation, or rescue which will enhance the survival of the species).
T Threatened	"Any resident species of plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (GS 19B 106: 202.12). (Regulations are the same as for Endangered Species).
SC Special Concern	"Any species of plant in North Carolina which requires monitoring but which may be collected and sold under regulations adopted under the provisions of [the Plant Protection and Conservation Act]" (GS 19B 106:202.12). (Special Concern species which are not also listed as Endangered or Threatened may be collected from the wild and sold under specific regulations. Propagated material only of Special Concern species which are also listed as Endangered or Threatened may be traded or sold under specific regulations.)
C Candidate	Species which are very rare in North Carolina, generally with 1-20 populations in the state, generally substantially reduced in numbers by habitat destruction (and sometimes also by direct exploitation or disease). These species are also either rare throughout their ranges (fewer than 100 populations total) or disjunct in North Carolina from a main range in a different part of the country or world. Also included are species which may have 20-50 populations in North Carolina, but fewer than 50 populations worldwide. These are species which have the preponderance of their distribution in North Carolina and whose fate depends largely on their conservation here. Also included are many species known to have once occurred in North Carolina but with no known extant occurrences in the state (historical or extirpated species); if these species are relocated in the state, they are likely to be listed as Endangered or Threatened. If present land use trends continue, candidate

* Natural Heritage Program List of the Rare Plants of North Carolina. U. S. Fish and Wildlife Service 1990 (with amendments 1993).

		species are likely to merit listing as Endangered or Threatened.
SR	**Significantly Rare**	Species which are very rare in North Carolina, generally substantially reduced in numbers by habitat destruction (and sometimes also by direct exploitation or disease). These species are generally more common somewhere else in their ranges, occurring in North Carolina peripherally to their main ranges, mostly in habitats which are unusual in North Carolina. Also included are some species with 20-100 populations in North Carolina, if they also have only 50-100 populations rangewide and are declining.
W	**Watch List**	Any other species believed to be rare and of conservation concern in the state but warranting active monitoring at this time.
P	**Proposed**	A species which has been formally proposed for listing as Endangered, Threatened, or Special Concern, but has not yet completed the legally mandated listing process.

United States Status		**Description**
E	**Endangered**	A taxon "which is in danger of extinction throughout all or a significant portion of its range" (Endangered Species Act, Section 3).
T	**Threatened**	A taxon "which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (Endangered Species Act, Section 3).
C1	**Candidate 1**	"Taxa for which the [Fish and Wildlife] Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. Development and publication of proposed rules on these taxa are anticipated; however, because of the large number of Category 1 taxa, it will take several years to clear the backlog."
C2	**Candidate 2**	"Taxa for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time... Further biological research and field study usually will be necessary to ascertain the status of [these taxa]... It is likely that some category 2 candidates will not warrant listing, while others will be found to be in greater danger of extinction than some taxa in category 1."
3A	**Candidate 3a**	"Taxa for which the Fish and Wildlife Service has persuasive evidence of extinction. If rediscovered, such taxa might acquire high priority for listing."

3B	**Candidate 3b**	"Names that, on the basis of current taxonomic understanding ... do not represent distinct taxa..."
3C	**Candidate 3c**	"Taxa that have proven to be more abundant or widespread than previously believed and/or those that are not subject to any identifiable threat. If further research or changes in habitat indicate a significant decline in any of these taxa, they may be reevaluated for possible inclusion in categories 1 or 2.
P	**Proposed**	"Taxa already proposed to be listed as" endangered or threatened. Taxa formally proposed as endangered or threatened receive some legal protection. Species listed as proposed candidates are species which are in the process of being added to the federal candidate list.
*	**Possibly Extinct**	Taxa with no known extant occurrences.

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